
Report on Geotechnical Investigation

**Proposed Residential Development
65 Muston Street, Mosman**

Prepared for Prosker Property Pty Ltd

Project 236982.00

12 February 2026

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature

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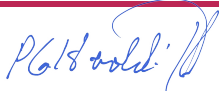
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Report on Geotechnical Investigation Proposed Residential Development 65 Muston Street, Mosman

1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a geotechnical investigation undertaken for a proposed residential development, including in-fill affordable housing, at 65 Muston Street, Mosman (the site). The investigation was commissioned within our Signed Services Order dated 18 July 2025 from Savvas Hadjimichael of Prosker Property Pty Ltd and was undertaken in accordance with Douglas' proposal 236982.00.P.001.Rev1 dated 14 July 2025.

The supplied information indicates that the proposed development is to comprise demolition of the existing residential unit building and construction of multi-storey residential unit building with four basement levels. Excavation depths of between about 6.8 m and 12.5 m below existing surface levels are anticipated for the basement.

It is understood that a geotechnical report is required to form part of the state significant development application (SSDA) as well as to provide information for design and construction purposes.

The aim of the investigation was to determine the subsurface soil, rock and groundwater conditions across the site and to provide an assessment of the geotechnical suitability of the site for the proposed development. In addition, comments on the subsurface profile, excavation conditions, excavation vibration, shoring and foundation design are provided together with a slope stability risk assessment.

The geotechnical investigation included the drilling of boreholes, installation of groundwater monitoring wells, in-situ strength testing, geological mapping / inspection, laboratory testing and engineering analysis. Details of the field work and comments relevant to design and construction are given in this report. A slope risk assessment was also conducted and was undertaken with reference to the Australian Geomechanics Society (AGS) Landslide Taskforce "Practice Note Guidelines for Landslide Risk Management", 2007 (Ref. 1).

Information provided for use in the investigation included:

- An architectural drawing package prepared by Studio Johnston Architects (Job No. 2509) comprising the following drawings (all Rev5, dated 10.02.2026): A-000-010, A-100-010, A-100-020, A-100-030, A-101-010, A-110-020, A-110-030, A-110-040, A-110-050, A-110-060, A-110-070, A-110-080, A-110-090, A-110-100, A-110-110, A-110-120, A-110-130, A-115-010, A-210-010, A-210-020, A-210-030, A-210-040, A-310-010, A-310-020, A-310-030, A-310-040, A-310-050, A-310-060, A-310-070, A-320-010, A-710-010, A-711-010, A-711-020, A-712-010, A-720-010, A-720-011; A-720-012; A-721-010; A-721-011; A-722-010, A-722-011, A-730-010, A-730-020, A-730-030, A-731-010, A-732-010, A-810-010, A-910-010, and
- A site survey plan (6 sheets) prepared by CMS Surveyors (Drawing name: 24328Bdetail, dated 20.01.2026).

A Preliminary Site (Contamination) Investigation was conducted in conjunction with the geotechnical investigation and the results have been reported separately (reference Douglas report 236982.01.R.001).

Item 12 (Ground and Groundwater Conditions) of the SEARs says ‘Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site and including soil erosion. Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies.’ In relation to this requirement, the SEARs ask for supporting documentation in the form of a Geotechnical Assessment. This report provides that assessment.

This report must be read in conjunction with all appendices including the notes provided in Appendix A.

2. Site description and geology

The site, 65 Muston Street, Mosman (known as SP32953) is situated on the eastern side of a north-south trending ridgeline (refer Figure 1). The site is an approximately rectangular shaped area of about 1342 m². The northern and southern boundaries are about 56 m long, and the eastern and western boundaries are about 24 m long.



Figure 1: Drone photo of the site looking north-west (photo taken on 7 August 2025)

The site is bounded to the north by a two and three storey rendered duplex building, to the south by a one and two storey rendered duplex building, to the east by Redan Lane and to the west by

Muston Street. At their closest points, the buildings situated to the north and south of the site are both built to within about 1.5 m of the common boundaries (refer Plate 1, Photo 1 and Photo 2).

The site is currently occupied by a two-storey brick and tile apartment building with a two-car garage on Muston Street (including a communal laundry underneath) and a two-car garage on Redan Lane. Pavements constructed of concrete and sandstone blocks surround the building and there are low height retaining walls that support garden beds on the western side of the building (refer Plate 2, Photo 5). An open grass covered slope is located on the eastern side of the building (refer Plate 3, Photo 7).

The survey plan indicates that the highest parts of the site along Muston Street to the west are at approximate RL 71.0 (to Australian Height Datum, AHD) with the lowest parts of the site along Redan Lane to the east at RL 62.4 m AHD. This gives a difference in level of about 8.6 m indicating an overall average site slope of about 9°.

Reference to the Geological Survey of NSW Seamless Geology Map indicates that the site is underlain by Hawkesbury Sandstone. Hawkesbury Sandstone typically comprises medium to coarse grained sandstone, both massive and cross-bedded generally with two sets of steeply dipping joints striking NNE and ESE. The geotechnical investigation confirmed the published mapping.

3. Field work methods

The field work was carried out by a geotechnical engineer over four weekdays between 7 and 12 August 2025 and included:

- On-site review of the available Before You Dig Australia (BYDA) drawings and Sydney Water 'Tap-In' drawings (for onsite sewer) followed by scanning the test locations for underground services using an electromagnetic scanner and ground penetrating radar (GPR);
- Seven dynamic cone penetrometer (DCP) tests to assess the in-situ soil strength and probe the depth to weathered bedrock. The borehole (BH) test numbers correspond with the DCP (DCP) test numbers (e.g. BH2 and DCP2 were at the same location);
- Drilling of four (4) boreholes (BH1 to BH4). Due to surface pavements at BH3 and BH4, the boreholes were initially drilled using a concrete coring machine. All boreholes were initially drilled through the soil using a hand-auger to depths of between 0.3 m and 1.0 m. Upon auger refusal, the open boreholes at BH1, BH2 and BH3 were lined with HQ casing and then advanced deeper using proline drilling comprising man-portable, NMLC-sized diamond core drilling equipment. The deep boreholes were drilled to depths of between 8.92 m and 15.55 m to obtain 50 mm diameter continuous samples of the rock for identification and strength testing purposes;
- Collection of soil samples from selected boreholes for strata identification and laboratory testing (environmental) together with logging, core photography and point load strength testing (Is_{50}) of the rock core;
- Installation of groundwater monitoring wells at the completion of drilling within BH1, BH2 and BH3. This involved placing Class 18 uPVC screen and solid casing in each borehole. A gravel pack was placed around the screen and a bentonite plug was placed above the gravel. The remainder of the void was backfilled with drill cuttings and the top of the wells were finished with a steel gatic cover at surface level;

- Mapping areas of rock outcrop, inspection and photography (including drone/UAV) of the site and surrounds; and
- Recording the ground surface levels and coordinates at each test location using a differential global positioning system (DGPS).

The test locations, areas of sandstone outcrop, selected site features and photo locations are indicated on Drawing 1 (Test Location Plan) in Appendix B.

4. Field work results

4.1 Boreholes

Details of the subsurface conditions encountered in the boreholes are presented in the borehole logs given in Appendix C. These should be read in conjunction with the accompanying notes which explain the descriptive terms and classification methods used.

The subsurface conditions encountered can be described as:

PAVEMENT	Steel reinforced concrete pavement – 100 mm thick at BH2 and 50 mm thick pavement at BH3.
FILL	Variably compacted sandy clay and sand fill with sandstone gravel to depths of between about 0.3 m and 0.9 m.
RESIDUAL SOIL	Generally pale orange and grey, medium grained sand (possibly extremely weathered rock) to depths of between 0.3 m and 1.0 m depth.
WEATHERED SANDSTONE	Generally, low to medium strength, moderately weathered, slightly fractured sandstone to variable depths of about 1 m to 4 m.
SANDSTONE	Fresh, slightly fractured and unbroken, medium strength sandstone with more fractured very low strength and low strength bands to variable depths of 8.4 m to 12.5 m over fresh high strength sandstone extending to the base of all boreholes. Some steep joints (about 60°) were encountered in all boreholes.

The small amount of core loss shown on BH1 and BH3 logs at the rock surface is likely due the top of weathered rock being washed away during drilling. Core loss in BH1 from 6.00 m to 6.15 m depth is likely due to the presence of weak and friable rock.

4.2 Dynamic Cone Penetrometer Test

Dynamic cone penetrometer tests (DCP1 to DCP4) were conducted adjacent to the boreholes and the DCP test results are shown on the borehole logs and given in the DCP test results sheet in Appendix C. DCP5-DCP7 were conducted in the lawn area east of the building and the results are given in Appendix C. The inferred 'top of rock' (TOR) reduced level (RL) at each test location is also indicated on Drawing 1 in Appendix B.

4.3 Mapping and Inspection

The inspection indicated the following:

- Rock outcrop comprising medium strength, moderately to slightly weathered sandstone located between the building and the garage on Redan Lane as a sub-vertical step/ledge that trends approximately north-northeast/south-southwest and is about 15 m long and up to 1.3 m high (refer Plate 1, Photo 3);
- Cracking and displacement of the return corner within the brick retaining wall built above the rock outcrop (refer Plate 2, Photo 4);
- Retaining walls supporting low height garden beds. Some walls exhibit bulging (refer Plate 2, Photo 6) and cracking along mortar joints;
- The exterior walls of the buildings on the site as well as the neighbouring visible structures surrounding the site appeared to be generally in good condition, with no significant cracking observed or evidence of slope movement; and
- Some minor water seepage on the exposed rock (refer Plate 2, Photo 4) was observed during the inspection which is likely water seepage over the top of rock.

4.4 Groundwater

Free groundwater was not observed during augering of BH1 to BH4 and the use of drilling water in BH1, BH2 and BH3 prevented groundwater observations during coring.

The groundwater monitoring wells installed within BH1, BH2 and BH3 were all purged dry soon after their installation and the water levels were measured on 18 August 2025 (7 days after completion of the site investigation). Measured water levels are provided in Table 1.

Table 1: Groundwater Observations in Monitoring Wells (m, AHD)

Date	Borehole	Screen Depth (m)	Surface RL (m AHD)	Groundwater Depth (m)	Groundwater RL (m AHD)
18 August 2025	BH1	15.6 – 9.0	69.4	3.6	65.8
18 August 2025	BH2	9.0 – 6.0	63.8	2.1	61.7
18 August 2025	BH3	15.6 – 9.0	68.8	1.8	67.0

It is noted that groundwater levels are transient and that fluctuations may occur in response to climatic and season conditions.

5. Laboratory testing

Samples of the better-quality rock core were tested to determine axial point load strength indices (Is_{50}). The results ranged from 0.1 MPa to 1.6 MPa which correspond to low to high strength rock, respectively. These Is_{50} results suggest an unconfined compressive strength (UCS) of about 2 MPa to 32 MPa for the rock tested based on published correlations between Is_{50} and UCS of 1:20.

The Is_{50} test results are shown on the borehole logs at the relevant depths.

6. Proposed development

The supplied information indicates that the proposed development is to comprise demolition of the existing structures and construction of a multi-storey residential apartment building over four basement levels. The basement (B02) finished floor will be constructed at about RL 57.2 m requiring excavation depths of between about 6.8 m and 12.5 m, from east to west. The vehicle

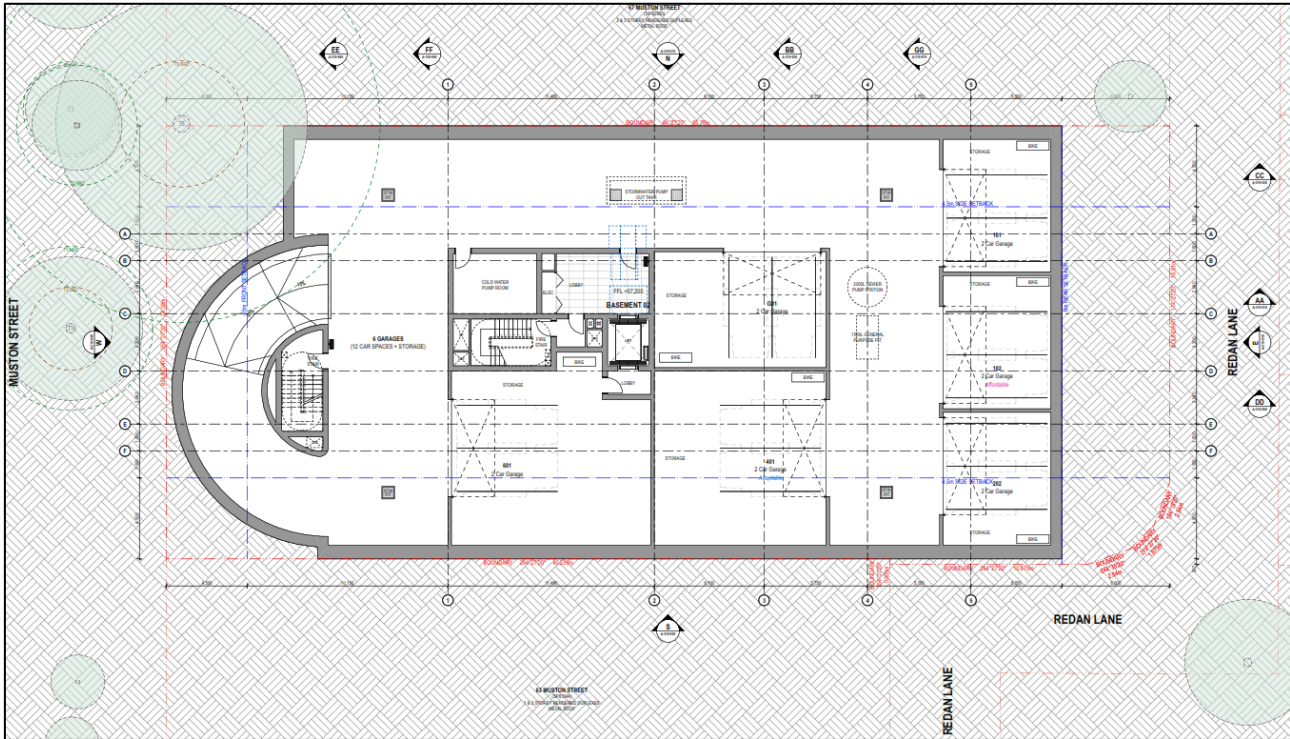


Figure 2: Proposed basement (B02) footprint (taken from Studio Johnston Drawing No. A-110-010)

access ramp will be located on the western side of the basement, and it will extend within about 0.3 m (at its closest point) of the western boundary (Muston Street). The eastern basement wall will extend within about 6.0 m from the eastern boundary (Redan Lane) and the basement will extend up to the northern and southern boundaries. A plan view of the proposed basement footprint is given in Figure 2.

7. Interpreted geological model

The site is located on the eastern side of a sloping hillside. The principal features of the geological model of the site comprise:

- A surficial layer of sandy fill and clayey sand or sand (residual soil) to depths of between about 0.9 m and 1.0 m, possibly deeper in some areas and including large sandstone floaters; underlain by
- Sandstone bedrock inferred to possibly step down the site towards the east in a series of small (obscured) near vertical steps and ledges.

This profile is characteristic of the landforms developed on Hawkesbury Sandstone in the vicinity of the harbour by the erosional and geomorphic processes. It is common, in this landform, for there to be some boulders or detached bedding slabs within the soil and upper rock profile above the level of sound, intact sandstone bedrock. The investigation indicates that there will generally be sandstone present at depths of between about 0.5 m and 1.5 m below the existing surface levels with the upper bed(s) of rock possibly including open joints due to weathering and past root jacking processes.

8. Comments

8.1 Acid Sulphate Soils

Based on the available published mapping and the Mosman LEP, the site is not located in an area mapped at risk of containing acid sulphate soils (ASS).

8.2 AGS Slope Stability Risk Assessment

The cracks and bulging observed in garden retaining walls are likely to be due to poor design and construction rather than an indicator of slope movement and instability.

Inspection of the general slope and existing structures on the site, including the exterior walls of the existing house, indicated no evidence of major defects attributable to significant slope instability. The site has been assessed in accordance with the methods of the Australian Geomechanics Society (AGS) "Practice Note Guidelines for Landslide Risk Management, 2007", (Reference 1), relevant extracts of which are included in Appendix E.

Identified hazards within and adjacent to the site are summarised in Table 2, together with a qualitative assessment of likelihood, consequence and slope instability risk to the existing and proposed structures after completion of construction (assuming appropriate engineering design and construction works).

Table 2: Slope Instability Risk Assessment for Risk to Property

Hazard	Likelihood	Consequence	Risk
Collapse of soils from above rock during excavation	Unlikely – provided soils are supported by shoring or battered to safe angles	Medium	Low
Collapse of excavated rock faces during construction	Unlikely – subject to inspection of rock faces during excavation and installation of any necessary rock bolts or shotcrete	Medium	Low
Block falling from finished excavation faces	Unlikely – subject to inspection of rock faces during excavation and installation of any necessary rock bolts or shotcrete	Medium	Low

Hazard	Likelihood	Consequence	Risk
Settlement or movement of new footings	Barely Credible – if footings are founded on sandstone bedrock inspected by geotechnical personnel and confirmed with respect to stability and allowable bearing pressure	Medium	Very Low

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

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

where:

$R_{(LoL)}$ is the risk (annual probability of loss of life of an individual);

$P_{(H)}$ is the annual probability of the hazardous event (e.g. failure of the wall/excavation);

$P_{(S:H)}$ is the probability of spatial impact by the hazard (e.g. of the failure reaching the residence considering the distance for a given event);

$P_{(T:S)}$ is the temporal probability (e.g. of the area being occupied by an individual) given the spatial impact; and

$V_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the impact).

The assessed individual risk to life (person most at risk) resulting from the identified hazards is summarised in Table 3.

Table 3: Slope Instability Risk Assessment for Risk to Life

Hazard	$P_{(H)}$	Person at risk	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	Risk $R_{(LoL)}$
Collapse of soils from above rock during excavation	Unlikely – 1×10^{-4} - provided the soils are supported by shoring or battered to safe angles	Person on site	2.86×10^{-3}	4.17×10^{-2}	0.2	2.38×10^{-9}
		Person next door	9.18×10^{-3}	0.75	0.001	6.89×10^{-10}
Collapse of excavated rock faces during construction	Unlikely – 1×10^{-4} - subject to inspection of rock faces during excavation and installation of any necessary rock bolts or shotcrete	Person on site	3.57×10^{-3}	4.17×10^{-2}	1	1.49×10^{-8}
		Person next door	9.18×10^{-2}	0.75	0.001	6.89×10^{-10}

Hazard	$P_{(H)}$	Person at risk	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	Risk $R_{(LoL)}$
Block falling from finished excavation faces	Unlikely – 1×10^{-4} – subject to inspection of rock faces during excavation and installation of any necessary rock bolts or shotcrete	Person on site	1.43×10^{-3}	0.28×10^{-2}	1	2.98×10^{-9}
		Person next door	5.36×10^{-3}	0.75	0.001	4.02×10^{-10}
Settlement or movement of new footings	Barely Credible – 1×10^{-6} – if footings are founded on sandstone bedrock inspected by geotechnical personnel and confirmed with respect to stability and allowable bearing pressure	Person on site	1	0.75	1×10^{-4}	7.5×10^{-11}

When compared to the Landslide Risk Management Guidelines of the AGS, it is considered that the proposed development meets 'Acceptable Risk Management' criteria with respect to both property and life for new developments under current and foreseeable conditions.

Provided the construction is undertaken in accordance with the recommendations contained in this report and using sound engineering and construction practices, the proposed work would not be expected to affect the overall stability of the site or negatively influence the geotechnical hazards identified in Tables 2 and 3.

8.3 Excavation

The plans indicate that up to about 12.5 m of excavation may be required for the basement floor levels. It is expected that the excavation will encounter shallow sandy fill and sand soils underlain by low and medium strength over medium and high strength sandstone bedrock. The fill and soil should be readily removed using conventional hydraulically operated earthmoving equipment with bucket attachments. Sandstone bedrock excavation will require rock saws, rotary mill heads or hydraulic rock breaking equipment.

8.4 Excavation Support

8.4.1 General

The proposed development requires a basement excavation that will be built up to the northern and southern site boundaries which comprise buildings built within about 1.5 m of the common

boundaries. The footing types and levels of the adjacent structures are not known. The eastern and western sides of the excavation will be set back about 6 m and 0.3 m (at its closest point), respectively, from the street boundaries. The vehicle access ramp to the basement will be set back about 0.3 m from the boundary.

The most appropriate type of excavation support will vary with subsurface conditions, depth of excavation, set back from site boundaries, and proximity of existing buildings and infrastructure. Batter slopes are likely to be possible for the eastern and western excavation however it is noted that testing was not able to be carried out close to the western boundary due to the risk of hitting underground services so rock levels adjacent to the Muston Street footpath should be confirmed. Shoring will be required to support soils along the northern and southern excavation faces.

8.4.2 Batter Slopes and Vertical Rock Excavations

Vertical excavations in fill, soil and weathered rock are not expected to be stable. Where space permits, temporary and permanent batters within the soil profile could be used. The suggested batter angles for temporary and permanent excavations in sandy fill and sand with a vertical height of less than 3 m is 1.5:1 (H:V) in the short term and 2:1 (H:V) or flatter for permanent slopes. Where space does not permit the construction of temporary batters it will be necessary to install shoring walls to support the surface soils.

Low to medium strength and stronger sandstone will generally stand vertically unsupported, unless unfavourably oriented jointing, such as those encountered in BH1, BH2, and to a lesser extent in BH3, is present. It will be necessary to undertake regular geotechnical inspections during excavation (every 1.5 m drop) to assess stability of the rock and to check for adverse jointing to determine if, and where, localised rock face support measures such as underpins, shotcrete, rock bolts, bracing or propping are required. Some allowance for stabilisation works should be made. Staged rock excavation should be considered along the northern boundary close to adjacent structures.

8.4.3 Retaining / Shoring Walls

Where space constraints exist, the overburden soil and any very low to low strength sandstone will need to be temporarily supported until the permanent basement wall/s are constructed. Shoring support may therefore be required from the ground surface down to at least the top of medium strength rock. Test pits should be excavated along the eastern boundary in advance of bulk excavation to check for areas where shoring may be required.

Soldier piles with reinforced shotcrete infill panels are commonly used to support excavations. The soldier piles would generally be spaced at about 2 m to 2.5 m centres and should be socketed into medium strength sandstone. Shotcreting should be undertaken in maximum 1.5 m or 2.0 m 'drops' as excavation proceeds to reduce the risk of local slippages and collapse between soldier piles. Temporary support will be required to prevent excessive lateral deformation of shoring / retaining walls. For the permanent situation, the basement structure usually provides the required lateral support to the perimeter excavation once the temporary support has been removed and the floor slab levels should be used in determining pile lengths.

The medium and high strength rock below the shoring (within the deeper section of the basement to the west) is expected to stand vertically, provided that no adverse defects are

encountered. Geotechnical inspections should be undertaken during excavation to confirm support requirements.

Bracing or propping of joint blocks, if required, will need to be specifically designed based on the orientation and nature of the individual joint block.

8.4.4 Earth Pressure Design

Excavation faces retained either temporarily or permanently will be subjected to earth pressures from the ground surface down to the top of medium strength rock. Table 4 outlines material and strength parameters that may be used for the preliminary design of excavation support structures.

Table 4: Typical Material and Strength Parameters for Excavation Support Structures

Material	Bulk Density (kN/m ³)	Earth Pressure Coefficient		
		Active (K _a)	At Rest (K _o)	Ultimate Passive (kPa)
Fill	18	0.4	0.6	-
Residual Soil	20	0.3	0.5	-
Weathered, Very Low to Low Strength Rock	22	0.2 ¹	0.3 ¹	750 ²
Medium Strength Rock	23	0 ¹	0 ¹	3,000 ²

Notes: ¹ Unless unfavourably jointed

² Only below bulk/detailed excavation level and where jointing is favourable

A triangular lateral earth pressure distribution could be assumed for cantilevered walls or walls with a single row of support.

The design of the shoring should allow for all surcharge loads, including building footings, inclined slopes behind the wall, and construction related activities.

Shoring walls should be designed for full hydrostatic pressure unless drainage of the ground behind impermeable walls can be provided.

8.4.5 Passive Resistance for Shoring Piles

Passive resistance for piles founded below the base of the bulk excavation (including allowance for services or footings) in medium strength sandstone may be based on an ultimate passive pressure given in Table 4. This ultimate value will need to incorporate a factor of safety (of at least 2) to limit the wall movement that is required to mobilise the full passive resistance. The top 0.5 m of the socket should be ignored due to possible disturbance (e.g. over-excavation) and tolerance effects. The passive restraint adopted in the design must not exceed the shear capacity of the pile.

8.4.6 Ground Anchors

If required, the design of temporary and permanent ground anchors or rock bolts for the support of excavations and/or shoring systems may be carried out based on the maximum bond stresses given in Table 5.

Table 5: Recommended Bond Stresses for Rock Anchor Design

Material Description	Maximum Allowable Bond Stress (kPa)	Maximum Ultimate Bond Stress (kPa)
Weathered Rock	150	300
Medium Strength Rock	500	1000

The parameters given in Table 5 assume that the drilled holes are clean and adequately flushed. The anchors should be bonded behind a line drawn up at 45° from the base of the shoring in sandstone, and "lift-off" tests should be carried out to confirm the anchor capacities. Trial anchors should be used to confirm bond stress values. It is suggested that ground anchors should be proof loaded to 125% of the design working load and locked-off at no higher than 80% of the working load, to allow for stress relief of the rock.

It will be necessary to obtain permission from neighbouring landowners prior to installing anchors that will extend beyond the site boundaries. In addition, care should be taken to avoid damaging buried services, pipes and subsurface structures during anchor installation.

8.5 Excavation Induced Rock Movement (Stress Relief)

Locked in stresses are present in Hawkesbury Sandstone. During excavation, these stresses will be released, which will result in some lateral movement, typically along existing sub-horizontal bedding planes. These lateral movements may cause cracking of adjacent buildings and services and may also cause increases in the loads on any anchors used to provide lateral restraint to the shoring walls.

Maximum movement will occur towards the top and centre of the deepest face. Based on previous experience, and on the proposed excavated face lengths, lateral movements of the edge of the excavation are likely to be in the order of 0.5 mm per metre depth of rock excavation (i.e. between 4 mm and 8 mm for a 12 m deep excavation) for the western excavation face (adjacent to Muston Street). Any re-entrant corners within the perimeter of the excavation are likely to move more than the straight sides of the excavation. Most of the stress-relief movement is expected to be complete once bulk level has been reached.

Consideration should be given to the locations of internal columns, connections with perimeter walls and other design issues so that future rock stress relief movements as a result of "creep" or from reactivation of earlier movement because of subsequent adjacent excavations (i.e. basements on neighbouring residences) does not affect the new structure. A gap between any unsupported rock faces and the new structure should be allowed for to account for such rock stress relief movement. Further geotechnical input should be sought if the floor slabs are required to support such faces in the long term.

8.6 Disposal of Excavated Material

Reference should be made to Douglas' Preliminary Site Investigation (Contamination) report for the project (Ref. 236982.01.R.001).

8.7 Excavation Vibration and Dilapidation Surveys

The proposed excavations are likely to be mostly through medium strength sandstone. Excavation of this material will be undertaken using equipment which is likely to generate vibration which could potentially disturb the neighbours or damage the nearby structures.

During excavation it will be necessary to use appropriate methods and equipment to keep ground vibration at adjacent buildings and structures within acceptable limits. The level of acceptable vibration is dependent on various factors including the type of structure (e.g. reinforced concrete or brick structures etc.), its structural condition, the frequency range of vibrations produced by the construction equipment, the natural frequency of the structure and the vibration transmitting medium.

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s vector sum peak particle velocity (VSPPV). This is generally much lower than the vibration levels required to cause structural damage to buildings. The Australian Standard AS2670.2-1990 "Evaluation of human exposure to whole-body vibrations – continuous and shock induced vibrations in buildings (1-80 Hz)" indicates an acceptable day time limit of 8 mm/s VSPPV for human comfort.

Based on the experience of Douglas and with reference to AS2670, it is suggested that a maximum VSPPV of 8 mm/s (applicable at the foundation level of existing buildings) be employed at this site for both architectural and human comfort considerations, although this vibration limit may need to be reduced for sensitive structures or equipment in the area and following a review of dilapidation surveys of adjacent buildings.

As the magnitude of vibration transmission is site specific, it is recommended that a vibration trial be undertaken at the commencement of rock excavation under the guidance of an experienced vibration specialist. The trial may indicate that smaller hammers or different types of excavation equipment should be used for excavation purposes.

To reduce the effects of vibration from hydraulic rock hammers, the work method should allow for:

- Rock sawing around the perimeter of the excavations;
- Use of rock hammers in short bursts to prevent generation of resonant frequencies; and
- Changing equipment or size of hammers if the vibration trial indicates that the vibrations are potentially damaging or disturbing.

Douglas suggests that permanent vibration monitors be set up on site to monitor all the vibrations during excavation and to allow for a change of excavation techniques to be undertaken, if required.

It is recommended that dilapidation (existing building condition) surveys be carried out on neighbouring buildings, pavements and infrastructure that may be affected by the excavation works and other demolition / construction activities. The dilapidation surveys should be

undertaken before the commencement of any excavation or demolition work, to document any existing defects so that claims for damage due to construction related activities can be accurately assessed.

8.8 Groundwater

The preliminary groundwater results suggest that the proposed basement excavation will possibly be constructed below the groundwater level measured in the boreholes. Ongoing groundwater seepage should be expected along strata boundaries and through joints and partings within the rock. Seepage may also be prevalent at the soil-rock interface.

Due to the sloping topography of the area and shallow depth to bedrock, it is expected that the permanent, regional groundwater table will be below the proposed building floor levels and that the proposed residential development of the site will have no significant influence on the existing surface and groundwater flow system, both on the site and in the surrounding area.

A drained basement is expected to be suitable for this site due to the anticipated relatively low permeability of the bedrock and depth of the regional groundwater table. It is likely, however, that the relevant approval authorities will require further monitoring of groundwater levels and detailed analysis of potential inflows to assess the impact of the drained basement.

Drainage measures will need to be provided in subsurface structures and retaining walls to allow seepage water to flow around the structures rather than exert hydrostatic pressures against them. Generally, water collected from drainage systems should be suitable for disposal by pumping to stormwater drains subject to confirmation testing of groundwater quality and approval from the Council.

8.9 Foundations

Based on the borehole logs, it is anticipated that at least medium strength sandstone will be present at or close to the proposed founding levels of the new building. Spread footings (i.e. pad or strip footings) within the excavation should be suitable for supporting the proposed building loads and could be designed based on an allowable bearing pressure of 3,500 kPa in the medium strength sandstone. If low strength bands are encountered then a reduced allowable bearing pressure of about 2000 kPa may apply, or footings may need to be taken deeper.

All spread footings should be inspected by an experienced geotechnical professional to check the adequacy of the foundation material. Foundations proportioned on the above allowable bearing pressure would be expected to experience total settlements of less than 1% of the footing width under the applied working load, with differential settlements of half this value.

8.10 Piles

Bored piles used for shoring support could also be used to support structural loads providing they are founded below the bulk excavation level. Bored piles could be proportioned based on the design parameters provided in Table 6.

Table 6: Design Parameters for Bored Piles

Material Description	Allowable End-Bearing Pressure (kPa)	Allowable Shaft Adhesion¹ (kPa)
Weathered Rock	1000	50
Medium Strength Rock	3500	300

Note: ¹ Provided adequate socket roughness is achieved and only below bulk excavation level

The settlement of a pile is dependent on the loads applied to the pile and the foundation conditions in the socket zone and below the pile toe. The total settlement of a bored pile designed using the parameters provided in this report should be less than a few millimetres upon application of the design load.

Once again, all bored piles should be inspected by an experienced geotechnical professional during construction to check the adequacy of the foundation material and to check the socket cleanliness and roughness.

8.11 Seismic Design

Based on the testing undertaken and in accordance with the Earthquake Loading Standard, AS1170.4-2024, the site has a hazard factor (z) of 0.08 and a site sub-soil class B_e (rock site).

9. Additional Requirements

Below is a summary of the recommended additional works that are required:

- Prior to commencement of construction:
 - o Dilapidation surveys of adjacent buildings and pavements;
 - o Test pits along the western boundary (Muston Street) to check rock depth and shoring or battering requirements; and
 - o Review of the proposed construction methodology and structural drawings for support of adjacent properties by a geotechnical engineer.
- At commencement of excavation:
 - o Vibration monitoring trial to test the impact of the proposed excavation equipment; and
 - o Inspection of drilling of some shoring piles (if required).
- During excavation:
 - o Continuous vibration monitoring;
 - o Precise survey monitoring of vertical and horizontal movements of the top of any shoring walls along property boundaries;
 - o Inspection of vertical cut faces in rock in depth intervals of no deeper than 1.5 m; and
 - o Inspection of footings for structures.

10. References

1. Australian Geomechanics Society Landslide Taskforce, 'Landslide Risk Management Guidelines for Landslide Risk Management 2007'; and
2. Structural design actions, Part 4: Earthquake actions in Australia (AS 1170.4 – 2024).

11. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 65 Muston Street, Mosman in line with Douglas' proposal dated 14 July 2025 and receipt of our signed services order dated 18 July 2025 received from Jane Van Hagen of SDHA, on behalf of Prosker Property Pty Ltd. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Prosker Property Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also because of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and testing locations. The advice may also be limited by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical and groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

About this Report

Introduction

These notes have been provided to amplify Douglas' report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

Douglas' reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Engagement Terms for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather

changes. They may not be the same at the time of construction as are indicated in the report; and

- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, Douglas will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, Douglas cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, Douglas will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, Douglas requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. Douglas would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

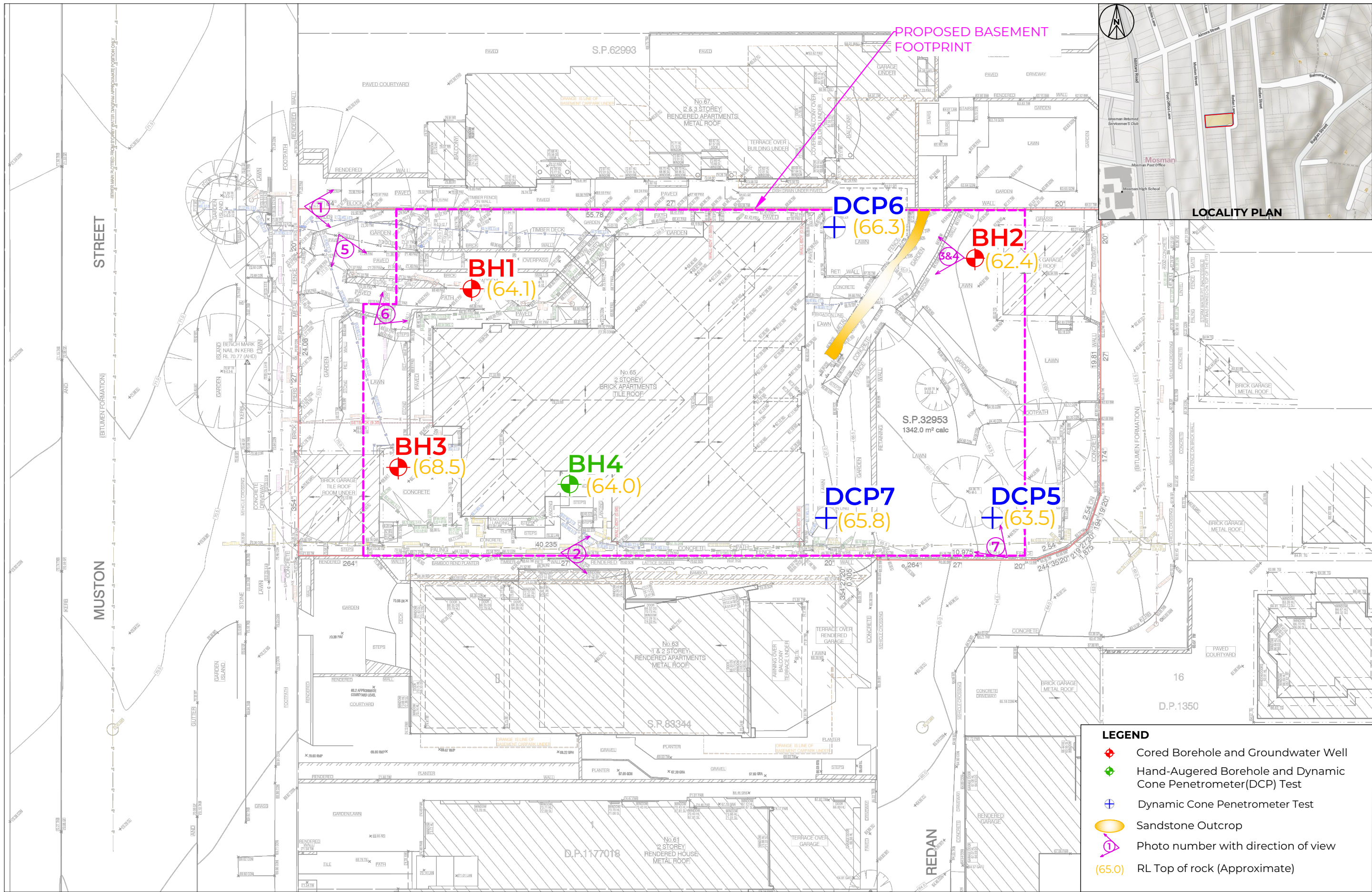
The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Appendix B

Drawing 1

P:\236982.00 - MOSMAN - 65 Muston Street\7.0 Drawings\7.2 Out\236982.00.D.001 Rev0_Test Location Plan.dwg



LEGEND

- Cored Borehole and Groundwater Well
- Hand-Augered Borehole and Dynamic Cone Penetrometer(DCP) Test
- Dynamic Cone Penetrometer Test
- Sandstone Outcrop
- Photo number with direction of view
- RL Top of rock (Approximate)

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Initial Issue	13.02.2026	MN/EC

SCALE: 0 1 2 3 4 5 6 7 8 9 10
1:250 @ A3

Douglas
PARTNERS
OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02) 9809 0666

CLIENT:
Prosker Property Pty Ltd

NOTE:
1: Base Survey Plan from CMS Surveyors pty ltd, Drawing Name 24328Edetail, Issue 6
(Dated 20.01.2026)

PROJECT NAME:
Proposed Residential Development
PROJECT ADDRESS:
65 Muston Street, Mosman

DRAWING TITLE:
Test Location Plan

PROJECT No:
236982.00
DRAWING No:
1
REVISION:
0

Appendix C

Fieldwork Results and Descriptive Notes

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 69.4 AHD
COORDINATE: E:337654.0, N:6255506.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236982.00
DATE: 07/08/25 - 08/08/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS							
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS				BACKFILL	WELL PIPE
RL (m)	TEST TYPE												RESULTS AND REMARKS					
18/08/25	0.25	FILL / Clayey SAND: dark brown; fine to coarse; contains organic matter and rootlets. Continued as rock log		FILL	ND		M		A/ES	0.10 0.20	0.10 0.20	Pile	pspp	<1ppm	10	15	Gate Cover	
69	1										1						Bentonite	
68	2										2							
67	3										3							
66	4										4							
65	5										5							
64	6										6							
63	7										7							
62	8										8							
61	9										9							
60																		

NOTES: #Soil origin is "probable" unless otherwise stated. °Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Proline
METHOD: HA to 0.25m, then NMLC to 15.55m
REMARKS:

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: HQ to 0.35m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 69.4 AHD
COORDINATE: E:337654.0, N:6255506.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236982.00
DATE: 07/08/25 - 08/08/25
SHEET: 2 of 3

[illegible]

NOTES: ^(#) Soil origin is "probable" unless otherwise stated.

PLANT: Proline

METHOD: HA to 0.25m, then NMLC to 15.55m

REMARKS:

OPERATOR: Tightsite (BB)

LOGGED: E. Miller

CASING: HQ to 0.35m

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 69.4 AHD
COORDINATE: E:337654.0, N:6255506.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236982.00
DATE: 07/08/25 - 08/08/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE				TESTING								
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	SOIL MOISTURE	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE		
	59	[CONT] SANDSTONE: grey, medium grained, thickly bedded; with indistinct crossbeds. Hawkesbury Sandstone.							100	100												
	11											10.78m: B, 5°, PR, RF					11	PLT	PL(A)=0.67MPa			
	58									100	100							12	PLT	PL(A)=1.6MPa		
	12																					
	57																					
	13	FR																				
	12.95m											12.95m: B, 0°, PR, RF					13	PLT	PL(A)=1.6MPa			
	56									100	100								PLT	PL(A)=0.67MPa		
	14																	14	PLT	PL(A)=1.0MPa		
	55																					
	15	Borehole discontinued at 15.55m depth. Target depth reached.							100	100												
	15.23m											15.23m: B, 0°, PR, CT Clay, RF										
	15.40m											15.40m: B, 0°, PR Clay 5mm, RF										
	16																					
	17																					
	53																					
	17																					
	52																					
	18																					
	51																					
	19																					
	50																					

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Proline
METHOD: HA to 0.25m, then NMLC to 15.55m
REMARKS:

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: HQ to 0.35m



Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT:

Prosker Property Pty Ltd

PROJECT:

Proposed Residential Development

LOCATION:

65 Muston Street, Mosman, NSW

SURFACE LEVEL:

69.4 AHD

COORDINATE:

E:337654.0, N:6255506.0

DATUM/GRID:

MGA2020 Zone 56

DIP/AZIMUTH:

90°/---°

LOCATION ID:

BH01

PROJECT No:

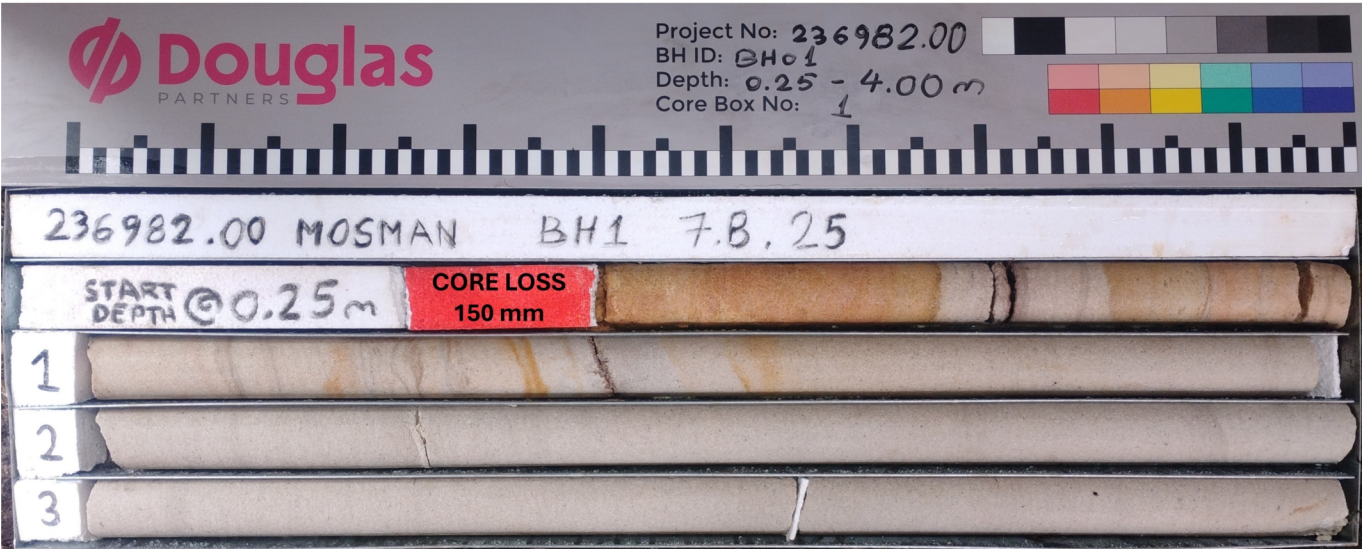
236982.00

DATE:

07/08/25 - 08/08/25

SHEET:

1 of 2



0.25-4.00 m depth



4.00-9.00 m depth

CORE PHOTO LOG

CLIENT: Prosker Property Pty Ltd

PROJECT: Proposed Residential Development

LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 69.4 AHD

COORDINATE: E:337654.0, N:6255506.0

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01

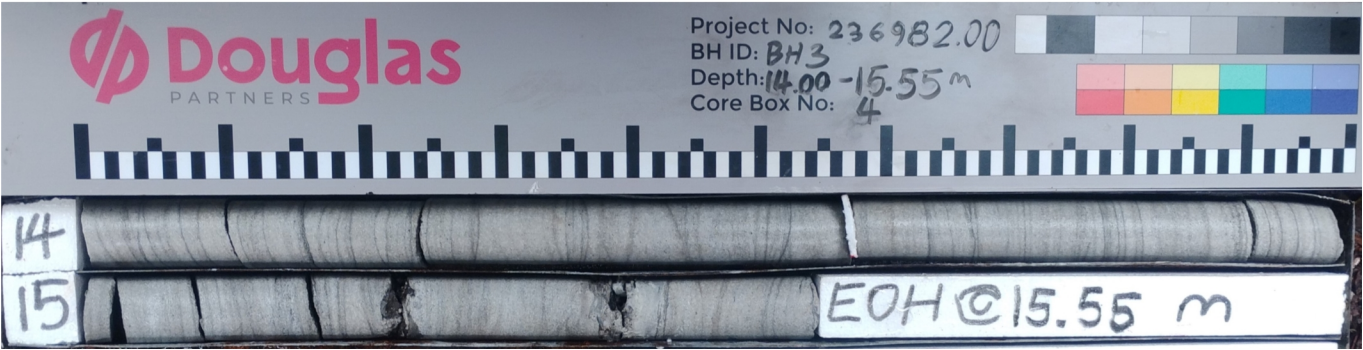
PROJECT No: 236982.00

DATE: 07/08/25 - 08/08/25

SHEET: 2 of 2



9.00-14.00 m depth



14.00-15.55 m depth

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 63.8 AHD
COORDINATE: E:337686.3, N:6255510.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236982.00
DATE: 11/08/25 - 12/08/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS										
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*) DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE					
2.10m 18/08/25	63	0.20	FILL / Clayey SAND trace gravel: dark brown and pale orange-brown; fine to coarse; fine to medium, sandstone gravel; contains roots and organic matter.		FILL	ND	M		A/ES	0.15	0.15	PID	<1ppm							
	63	0.90	FILL / SAND: pale brown-grey and grey; fine to coarse; possibly reworked natural soil.		FILL	MD	W		A/ES	0.40	0.50	PIP	<1ppm							
	62	1.00	SAND (SW) with gravel: pale brown-grey; fine to coarse; fragments of very low to low strength sandstone gravel; well graded.		XWM							1								
			Continued as rock log																	
	62	2											2							
	61	3											3							
	60	4											4							
	59	5											5							
	58	6											6							
	57	7											7							
56	8									8										
55	9									9										
54																				

NOTES: ^(*)Soil origin is "probable" unless otherwise stated. ^(*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Proline
METHOD: HA to 1m, then NMLC to 8.92m
REMARKS: Water encountered at 0.30m

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: HQ to 1.3m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 63.8 AHD
COORDINATE: E:337686.3, N:6255510.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236982.00
DATE: 11/08/25 - 12/08/25
SHEET: 2 of 2

[illegible]

NOTES: (#) Soil origin is "probable" unless otherwise stated.

PLANT: Proline
METHOD: HA to 1m, then NMLC to 8.92m
REMARKS: Water encountered at 0.30m

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: HQ to 1.3m

CORE PHOTO LOG

CLIENT: Prosker Property Pty Ltd

PROJECT: Proposed Residential Development

LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 63.8 AHD

COORDINATE: E:337686.3, N:6255510.0

DATUM/GRID: MGA2020 Zone 56

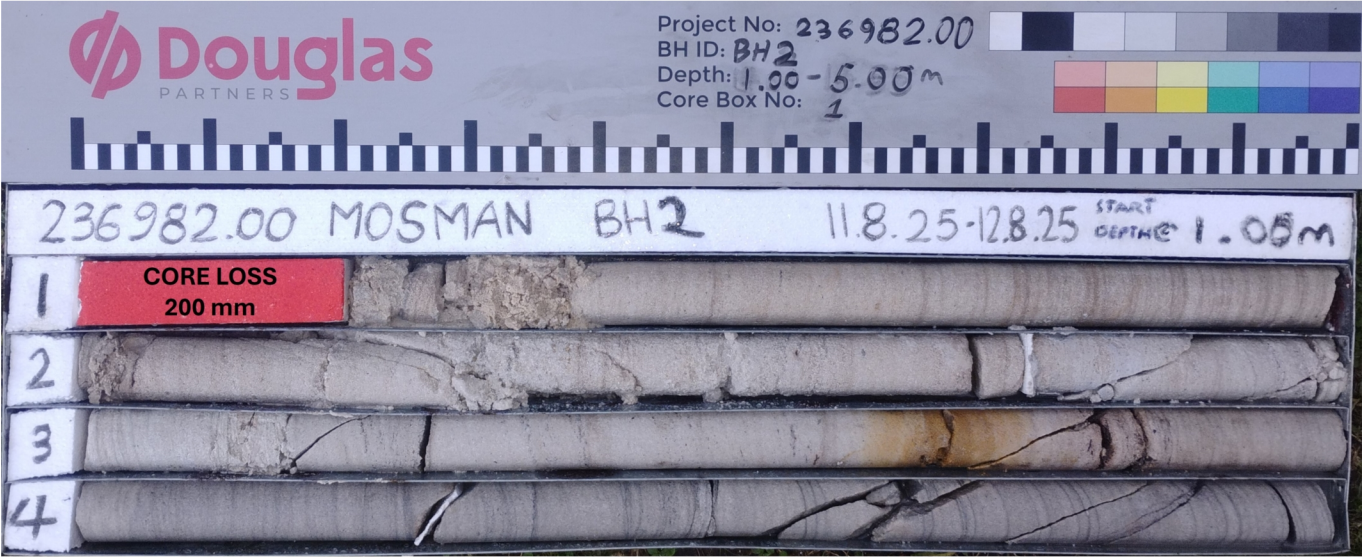
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02

PROJECT No: 236982.00

DATE: 11/08/25 - 12/08/25

SHEET: 1 of 1



1.00-5.00 m depth



5.00-8.92 m depth

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 68.8 AHD
COORDINATE: E:337649.1, N:6255494.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236982.00
DATE: 08/08/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED									SAMPLE			TESTING AND REMARKS				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS.(%)	DENSITY.(g)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		0.10	CONCRETE; 100 mm thick; 8mm reinforcement bar at 40mm depth.		NA	NA	NA	NA				0.10				
		0.25			FILL	ND		M		A/ES		0.20				
		0.30	FILL / SAND trace gravel trace cobbles: dark brown-grey; fine to coarse; fine to coarse, sandstone gravel; sandstone cobbles.													
		1	SANDSTONE: pale grey and orange-brown, fine to coarse grained; apparent very low to low strength.									1				
			Continued as rock log													
	17.5m															
	18/08/25	67										2				
		66										3				
		65										4				
		64										5				
		63										6				
		62										7				
		61										8				
		60										9				
		59														

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Proline
METHOD: HA to 0.3m, then NMLC to 15.55m
REMARKS: Replicate Sample *BD/20250808 collected from 0.10-0.20m

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 68.8 AHD
COORDINATE: E:337649.1, N:6255494.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: BH03
PROJECT No: 236982.00
DATE: 08/08/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED										SAMPLE				TESTING						
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
RL (m)																				
18/09/25	68	Continued from soil log				0.30	L				0.38m: P, 0-5°, UN, SN Fe, RF					PLT	PL(A)=0.08MPa	Ca Cover		
1.75m	67	SANDSTONE: pale orange-brown; massive. Hawkesbury Sandstone.				0.40		100	94						1	PLT	PL(A)=0.41MPa			
	66					1.65	L M				1.22m: P, 5°, PR, VNR Clay, SM 1.36m: JT, 40-60°, PR, SN Fe, RF, (1.28-1.44m); (160mm) 1.66m: P, 0°, PR, VNR Clay, RF				2	PLT	PL(A)=0.29MPa			
	65	2.79m-3.69m: Very low to low strength bands (up to 150mm thick) with joints and clay; extremely weathered; (possible sub-horizontal shearing)				2.79	L	100	93		2.79m: P, 0-5°, CU, SN Clay, RF				3	PLT	PL(A)=0.04MPa			
	64					2.90	VL				2.90m: JT, 60°, CU, VNR Clay, RF, (2.79-3m); (120mm)									
	63					3.00	VL				3.00m: P, 0-5°, UN, SN Clay, RF									
	62					3.26	VL L				3.09m: P, 0-5°, UN, VNR Clay, RF									
	61					3.69					3.19m: JT, 70°, UN, VNR Clay, RF, (3.09-3.29m); (200mm) 3.38m: P, 0-5°, PR, SN Clay, RF 3.53m: P, 0-5°, UN, SN Clay, RF 3.60m: P, 0-5°, PR, VNR Clay, RF 3.69m: P, 0-5°, PR, VNR Clay, RF 4.27m: P, 0-5°, PR, SN Clay, RF 4.39m: P, 0-5°, PR, VNR Clay, RF 4.68m: P, 0°, PR, CN, RF 5.45m: EW, Clay 5mm				4	PLT	PL(A)=0.43MPa	Bentonite		
	60	SANDSTONE: pale grey, medium grained, thinly bedded; with indistinct crossbeds. Hawkesbury Sandstone.					M	100	90							5	PLT	PL(A)=0.41MPa		
	59					5.85	SEAM	100	93		5.85-5.95m: EW, Clay 100mm				6	PLT	PL(A)=0.32MPa			
						5.95					6.22m: JT, 50-70°, UN, SN CBS, RF, (HE)					PLT	PL(A)=0.59MPa			
							M								7	PLT	PL(A)=0.97MPa			
						7.80	L								8	PLT	PL(A)=0.24MPa			
		8.22m-9.05m: Carbonaceous lenses 1-8mm thick				8.22	M				8.22m: P, 0-30°, UN, VNR CBS, RF 8.52m: P, 0-50°, SN CBS, RF 8.81m: IS, Clay, fine to medium grained quartz and gravels 8.91m: P, 0-20°, PR, SN Clay, RF 8.94m: P, 0-50°, IR, SN Clay, RF 9.05m: EW, Clay 40mm, CBS 9.28m: EW, Clay 40mm				9	PLT	PL(A)=0.59MPa	Gravel		
		8.93m-9.03m: Siltstone band					M	100	98							PLT	PL(A)=0.63MPa			
								100	100							PLT	PL(A)=0.71MPa			
NOTES: #Soil origin is "probable" unless otherwise stated.																				

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Proline
METHOD: HA to 0.3m, then NMLC to 15.55m
REMARKS: Replicate Sample *BD/20250808 collected from 0.10-0.20m

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: Uncased

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 68.8 AHD
COORDINATE: E:337649.1, N:6255494.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236982.00
DATE: 08/08/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE				TESTING							
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)		GRAPHIC	WEATH.		DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
RL (m)																					
	10.00	SANDSTONE: pale grey, medium grained, thinly bedded; with indistinct crossbeds. Hawkesbury Sandstone.																			
58	11									100	100		10.54m: EW, Clay 10mm					PLT	PL(A)=0.91MPa		
	12									100	100							PLT	PL(A)=0.91MPa		
56	13												12.59m: P, 10-20°, PR, Clay 3mm, RF					PLT	PL(A)=1.2MPa		
55	14									100	100							PLT	PL(A)=1.5MPa		
54	15									100	100		15.23m: P, 0-10°, UN, VNR Clay, RF 15.40m: P, 0-20°, IR, VNR Clay, RF					PLT	PL(A)=1.1MPa		
	16	Borehole discontinued at 15.55m depth. Target depth reached.																			
	17																				
	18																				
	19																				
	20																				

NOTES: #Soil origin is "probable" unless otherwise stated.

NOTES: #Soil origin is "probable" unless otherwise stated.

PLANT: Proline
METHOD: HA to 0.3m, then NMLC to 15.55m
REMARKS: Replicate Sample *BD/20250808 collected from 0.10-0.20m

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 68.8 AHD
COORDINATE: E:337649.1, N:6255494.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236982.00
DATE: 08/08/25
SHEET: 1 of 2



0.30-4.00 m depth



4.00-9.00 m depth

CORE PHOTO LOG

CLIENT: Prosker Property Pty Ltd

PROJECT: Proposed Residential Development

LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 68.8 AHD

COORDINATE: E:337649.1, N:6255494.0

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03

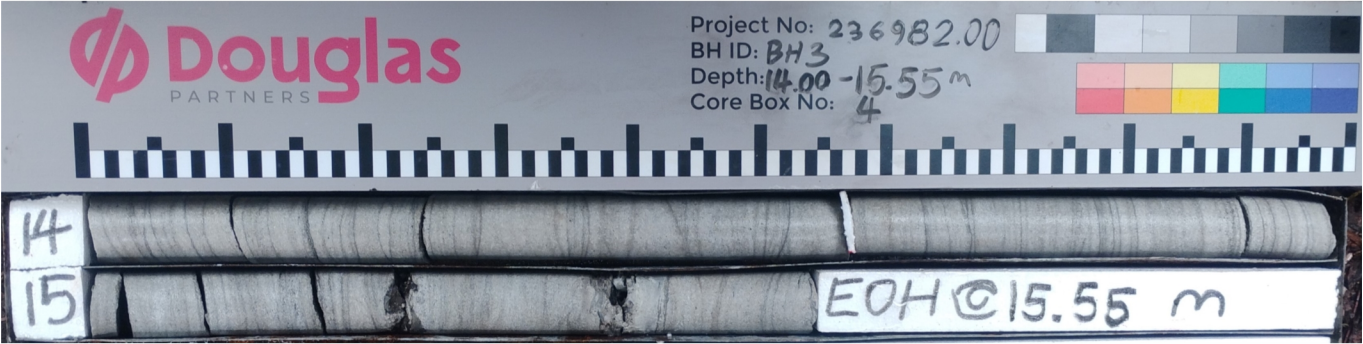
PROJECT No: 236982.00

DATE: 08/08/25

SHEET: 2 of 2



9.00-14.00 m depth



14.00-15.55 m depth

BOREHOLE LOG

CLIENT: Prosker Property Pty Ltd
PROJECT: Proposed Residential Development
LOCATION: 65 Muston Street, Mosman, NSW

SURFACE LEVEL: 70.3 AHD
COORDINATE: E:337661.9, N:6255493.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 236982.00
DATE: 08/08/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS							
08/08/25 No Free Groundwater Observed Whilst Augering	69	0.05	CONCRETE; 50 mm thick; mesh reinforcement bar ~8mm diameter located under the slab.		NA	NA	NA						PID		5	10	15				
		FILL / Gravelly SAND: grey; fine to coarse; fine to coarse, sandstone gravel.		FILL	ND	M	ES	0.10 0.15													
		Borehole discontinued at 0.20m depth. Refusal on bricks.																			
	70																				



Bricks at the base of borehole

NOTES: #Soil origin is "probable" unless otherwise stated. %Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Proline
METHOD: HA to 0.2m
REMARKS:

OPERATOR: Tightsite (BB)

LOGGED: E. Miller
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style **XW**. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

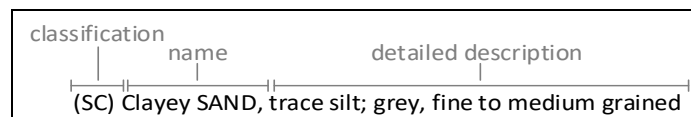
Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Introduction

All materials which are not considered to be “in-situ rock” are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:



The “classification” comprises a two character “group symbol” providing a general summary of dominant soil characteristics. The “name” summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either “fine grained” (also known as “cohesive” behaviour) or “coarse grained” (“non cohesive” behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as “oversize”	
Cobble	63 - 200		
Gravel ¹	2.36 - 63	Coarse	>65%
Sand ¹	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

¹ – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer “component proportions” below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a “Sandy CLAY”, this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a “primary”, “secondary”, or “minor” component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition ¹	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor ²	Present in the soil, but not significant to its engineering properties	All other components	All other components

¹ As defined in AS1726-2017 6.1.4.4

² In the detailed material description, minor components are split into two further sub-categories. Refer “identification of minor components” below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, “INTERBEDDED Silty CLAY AND SAND”.

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component ¹	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

¹ – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type	Particle size (mm)	
	Gravel	Sand
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

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code **NDF**, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example **(VS)**.

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as “extremely weathered material” in reports and by the abbreviation code **XWM** on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than ‘very low’ as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be “oversize” may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with “MIXTURE OF”.

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Rock Strength

Rock strength is defined by the unconfined compressive strength, and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index ¹ $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

¹ Rock strength classification is based on UCS. The UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site. The point load Index ranges shown above are as suggested in AS1726 and should not be relied upon without supporting evidence.

The following abbreviation codes are used for soil layers or seams of material “within rock” but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the “Description of Strata” and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

Weathering Term	Description	Abbreviation Code
Residual Soil ¹	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.	RS
Extremely weathered ¹	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	XW
Highly weathered	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 recognisable. 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.	HW
Moderately weathered	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 recognisable but shows little or no change of strength from fresh rock.	MW
Slightly weathered	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.	SW
Fresh	No signs of decomposition or staining.	FR
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	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 weathered products in pores.	DW

¹ The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$RQD \% = \frac{\text{cumulative length of 'sound' core sections} > 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e., drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Cleavage	CL
Crushed seam	CS
Crushed zone	CZ
Drilling break	DB
Decomposed seam	DS
Drill lift	DL
Extremely Weathered seam	EW
Fault	F
Fracture	FC
Fragmented	FG
Handling break	HB
Infilled seam	IS
Joint	JT
Lamination	LAM
Shear seam	SS
Shear zone	SZ
Vein	VN
Mechanical break	MB
Parting	P
Sheared Surface	S

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CN
Coating	CT
Healed	HE
Infilled	INF
Stained	SN
Tight	TI
Veneer	VNR

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLAY
Iron oxide	FE
Manganese	MN
Pyrite	Py
Secondary material	MS
Silt	M
Quartz	Qz
Unidentified material	MU

Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Discontinuous	DIS
Irregular	IR
Planar	PR
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RF
Smooth	SM
Slickensided	SL
Very rough	VR

Defect Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

intentionally blank

Results of Dynamic Penetrometer Tests

Client Prosker Property Pty Ltd

Project No. 236982.00

Project Proposed Residential Development

Date 14-Aug-25

Location 65 Muston Street, Mosman

Page No. 1 of 1

Test	5	6	7							
Surface Reduced Level (m. AHD)	64.7	67.2	67.0							
Depth (m)										
0 - 0.15	2	2	2							
0.15 - 0.30	3	3	4							
0.30 - 0.45	3	2	5							
0.45 - 0.60	4	4	4							
0.60 - 0.75	3	6	5							
0.75 - 0.90	6	6 (B)	6							
0.90 - 1.05	8		6							
1.05 - 1.20	10 (B)		12 (B)							
1.20 - 1.35										
1.35 - 1.50										
1.50 - 1.65										
1.65 - 1.80										
1.80 - 1.95										
1.95 - 2.10										
2.10 - 2.25										
2.25 - 2.40										
2.40 - 2.55										
2.55 - 2.70										
2.70 - 2.85										
2.85 - 3.00										
3.00 - 3.15										
3.15 - 3.30										
3.30 - 3.45										
3.45 - 3.60										

Test Method AS 1289.6.3.2, Cone Penetrometer ☒
AS 1289.6.3.3, Flat End Penetrometer ☐

Tested By PGH
Checked By PGH

Remarks R = Refusal, 25/110 indicates 25 blows for 110 mm penetration
B = Bouncing E = Excavated D = Discontinued

Appendix D

Site Photographs



Photo 1: Photo looking east down the common northern boundary



Photo 2: Photo looking east down the common southern boundary



Photo 3: Rock outcrop

 GROUND ED EXPERTISE	CLIENT: Prosker Property Pty Ltd		TITLE: Geotechnical Investigation: Photos 1 - 3 Proposed Residential Development 65 Muston Street, Mosman	PROJECT No: 236982.00
	OFFICE: Sydney	DRAWN BY: PGH		PLATE No: 1
	SCALE: NA	DATE: Aug-25		REVISION: 0

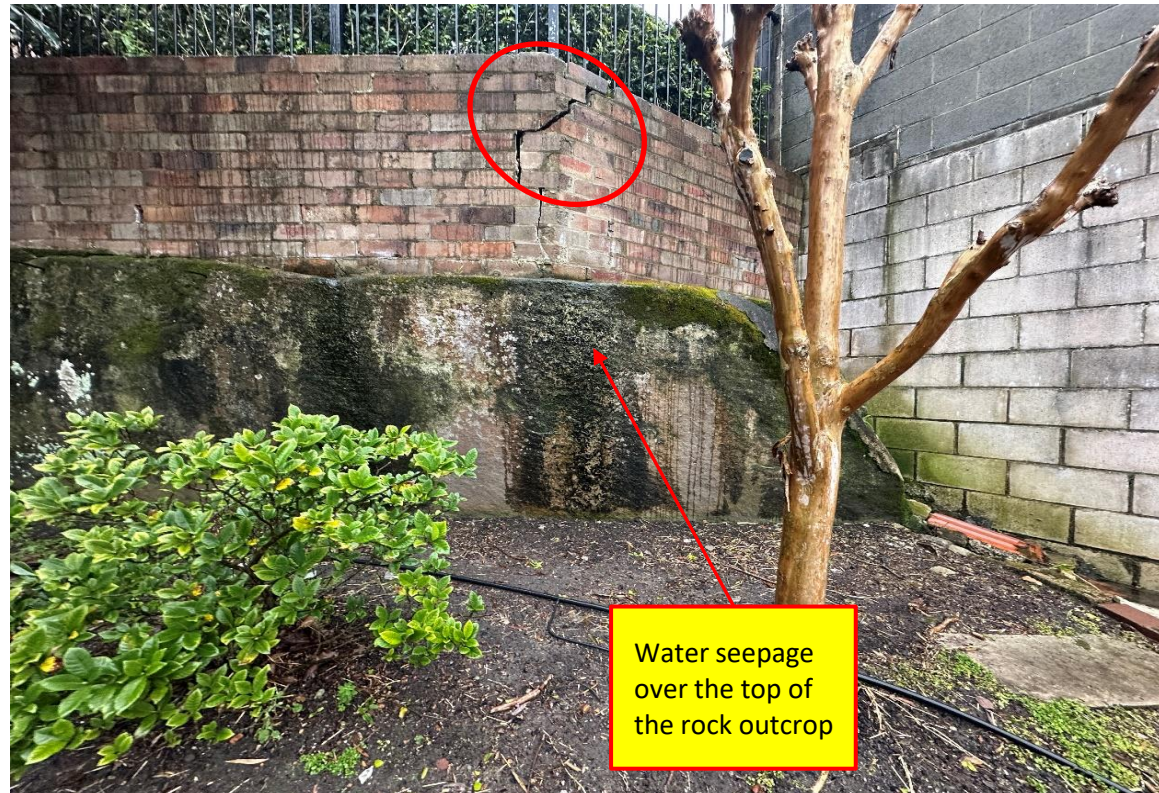


Photo 4: Cracked brick retaining wall and water seepage



Photo 6: Bulging garden bed retaining wall



Photo 5: Garden area west of the building



GROUNDED
EXPERTISE

CLIENT: Prosker Property Pty Ltd	
OFFICE: Sydney	DRAWN BY: PGH
SCALE: NA	DATE: Aug-25

TITLE: **Geotechnical Investigation: Photos 4 - 6**
Proposed Residential Development
65 Muston Street, Mosman

PROJECT No:	236982.00
PLATE No:	2
REVISION:	0



Photo 7: Lawn area east of the building

 GROUND ED EXPERTISE	CLIENT: Prosker Property Pty Ltd		TITLE: Geotechnical Investigation: Photo 7 Proposed Residential Development 65 Muston Street, Mosman	PROJECT No: 236982.00
	OFFICE: Sydney	DRAWN BY: PGH		PLATE No: 3
	SCALE: NA	DATE: Aug-25		REVISION: 0

Appendix E

Extracts from AGS 'Practise Note Guidelines for Landslide Risk Management, 2007'

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007
APPENDIX C: LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

QUALITATIVE MEASURES OF LIKELIHOOD

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10 ⁻¹	5x10 ⁻²	10 years	20 years	The event is expected to occur over the design life.	ALMOST CERTAIN	A
10 ⁻²		100 years		The event will probably occur under adverse conditions over the design life.	LIKELY	B
10 ⁻³	5x10 ⁻³	1000 years	200 years	The event could occur under adverse conditions over the design life.	POSSIBLE	C
10 ⁻⁴	5x10 ⁻⁴	10,000 years	2000 years	The event might occur under very adverse circumstances over the design life.	UNLIKELY	D
10 ⁻⁵	5x10 ⁻⁵	100,000 years	20,000 years	The event is conceivable but only under exceptional circumstances over the design life.	RARE	E
10 ⁻⁶	5x10 ⁻⁶	1,000,000 years	200,000 years	The event is inconceivable or fanciful over the design life.	BARELY CREDIBLE	F

Note: (1) The table should be used from left to right; use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*.

QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage.	CATASTROPHIC	1
60%		Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage.	MAJOR	2
20%	40%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage.	MEDIUM	3
5%	10%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works.	MINOR	4
0.5%	1%	Little damage. (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0.1%. See Risk Matrix.)	INSIGNIFICANT	5

- Notes:** (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures.
- (3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees, and consequential costs such as legal fees, temporary accommodation. It does not include additional stabilisation works to address other landslides which may affect the property.
- (4) The table should be used from left to right; use Approximate Cost of Damage or Description to assign Descriptor, not *vice versa*

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	1: CATASTROPHIC 200%	2: MAJOR 60%	3: MEDIUM 20%	4: MINOR 5%	5: INSIGNIFICANT 0.5%
A – ALMOST CERTAIN	10 ⁻¹	VH	VH	VH	H	M or L (5)
B – LIKELY	10 ⁻²	VH	VH	H	M	L
C – POSSIBLE	10 ⁻³	VH	H	M	M	VL
D – UNLIKELY	10 ⁻⁴	H	M	L	L	VL
E – RARE	10 ⁻⁵	M	L	L	VL	VL
F – BARELY CREDIBLE	10 ⁻⁶	L	VL	VL	VL	VL

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.

(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

RISK LEVEL IMPLICATIONS

Risk Level		Example Implications (7)
VH	VERY HIGH RISK	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
H	HIGH RISK	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
L	LOW RISK	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
VL	VERY LOW RISK	Acceptable. Manage by normal slope maintenance procedures.

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

AUSTRALIAN GEOGUIDE LR7 (LANDSLIDE RISK)

LANDSLIDE RISK

Concept of Risk

Risk is a familiar term, but what does it really mean? It can be defined as *"a measure of the probability and severity of an adverse effect to health, property, or the environment."* This definition may seem a bit complicated. In relation to landslides, geotechnical practitioners (GeoGuide LR1) are required to assess risk in terms of the likelihood that a particular landslide will occur and the possible consequences. This is called landslide risk assessment. The consequences of a landslide are many and varied, but our concerns normally focus on loss of, or damage to, property and loss of life.

Landslide Risk Assessment

Some local councils in Australia are aware of the potential for landslides within their jurisdiction and have responded by designating specific "landslide hazard zones". Development in these areas is often covered by special regulations. If you are contemplating building, or buying an existing house, particularly in a hilly area, or near cliffs, go first for information to your local council.

Landslide risk assessment must be undertaken by a geotechnical practitioner. It may involve visual inspection, geological mapping, geotechnical investigation and monitoring to identify:

- potential landslides (there may be more than one that could impact on your site)
- the likelihood that they will occur
- the damage that could result
- the cost of disruption and repairs and
- the extent to which lives could be lost.

Risk assessment is a predictive exercise, but since the ground and the processes involved are complex, prediction tends to lack precision. If you commission a

landslide risk assessment for a particular site you should expect to receive a report prepared in accordance with current professional guidelines and in a form that is acceptable to your local council, or planning authority.

Risk to Property

Table 1 indicates the terms used to describe risk to property. Each risk level depends on an assessment of how likely a landslide is to occur and its consequences in dollar terms. "Likelihood" is the chance of it happening in any one year, as indicated in Table 2. "Consequences" are related to the cost of repairs and temporary loss of use if a landslide occurs. These two factors are combined by the geotechnical practitioner to determine the Qualitative Risk.

TABLE 2: LIKELIHOOD

Likelihood	Annual Probability
Almost Certain	1:10
Likely	1:100
Possible	1:1,000
Unlikely	1:10,000
Rare	1:100,000
Barely credible	1:1,000,000

The terms "unacceptable", "may be tolerated", etc. in Table 1 indicate how most people react to an assessed risk level. However, some people will always be more prepared, or better able, to tolerate a higher risk level than others.

Some local councils and planning authorities stipulate a maximum tolerable level of risk to property for developments within their jurisdictions. In these situations the risk must be assessed by a geotechnical practitioner. If stabilisation works are needed to meet the stipulated requirements these will normally have to be carried out as part of the development, or consent will be withheld.

TABLE 1: RISK TO PROPERTY

Qualitative Risk		Significance - Geotechnical engineering requirements
Very high	VH	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low. May be too expensive and not practical. Work likely to cost more than the value of the property.
High	H	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable level. Work would cost a substantial sum in relation to the value of the property.
Moderate	M	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as possible.
Low	L	Usually acceptable to regulators. Where treatment has been needed to reduce the risk to this level, ongoing maintenance is required.
Very Low	VL	Acceptable. Manage by normal slope maintenance procedures.

AUSTRALIAN GEOGUIDE LR7 (LANDSLIDE RISK)

Risk to Life

Most of us have some difficulty grappling with the concept of risk and deciding whether, or not, we are prepared to accept it. However, without doing any sort of analysis, or commissioning a report from an "expert", we all take risks every day. One of them is the risk of being killed in an accident. This is worth thinking about, because it tells us a lot about ourselves and can help to put an assessed risk into a meaningful context. By identifying activities that we either are, or are not, prepared to engage in we can get some indication of the maximum level of risk that we are prepared to take. This knowledge can help us to decide whether we really are able to accept a particular risk, or to tolerate a particular likelihood of loss, or damage, to our property (Table 2).

In Table 3, data from NSW for the years 1998 to 2002, and other sources, is presented. A risk of 1 in 100,000 means that, in any one year, 1 person is killed for every 100,000 people undertaking that particular activity. The NSW data assumes that the whole population undertakes the activity. That is, we are all at risk of being killed in a fire, or of choking on our food, but it is reasonable to assume that only people who go deep sea fishing run a risk of being killed while doing it.

It can be seen that the risks of dying as a result of falling, using a motor vehicle, or engaging in water-related activities (including bathing) are all greater than 1:100,000 and yet few people actively avoid situations where these risks are present. Some people are averse to flying and yet it represents a lower risk than choking to death on food. Importantly, the data also indicate that, even when the risk of dying as a consequence of a particular event is very small, it could still happen to any one of us any day. If this were not so, no one would ever be struck by lightning.

Most local councils and planning authorities that stipulate a tolerable risk to property also stipulate a tolerable risk to life. The AGS Practice Note Guideline recommends that 1:100,000 is tolerable in newly

developed areas, where works can be carried out as part of the development to limit risk. The tolerable level is raised to 1:10,000 in established areas, where specific landslide hazards may have existed for many years. The distinction is deliberate and intended to prevent the concept of landslide risk management, for its own sake, becoming an unreasonable financial burden on existing communities. Acceptable risk is usually taken to be one tenth of the tolerable risk (1:1,000,000 for new developments and 1:100,000 for established areas) and efforts should be made to attain these where it is practicable and financially realistic to do so.

TABLE 3: RISK TO LIFE

Risk (deaths per participant per year)	Activity/Event Leading to Death (NSW data unless noted)
1:1,000	Deep sea fishing (UK)
1:1,000 to 1:10,000	Motor cycling, horse riding , ultra-light flying (Canada)
1:23,000	Motor vehicle use
1:30,000	Fall
1:70,000	Drowning
1:180,000	Fire/burn
1:660,000	Choking on food
1:1,000,000	Scheduled airlines (Canada)
1:2,300,000	Train travel
1:32,000,000	Lightning strike

More information relevant to your particular situation may be found in other AUSTRALIAN GEOGUIDES:

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR8 - Hillside Construction
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 - Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners; local councils; planning authorities; developers; insurers; lawyers and, in fact, anyone who lives with, or has an interest in, a natural or engineered slope, a cutting, or an excavation. They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove, reduce, or minimise the risk they represent. The GeoGuides have been prepared by the [Australian Geomechanics Society](#), a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering. The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program.