Douglas PARTNERS

GROUNDED EXPERTISE

Report on Geotechnical Investigation

Proposed Boat Shed

60 Hudson Parade, Clareville, NSW

Prepared for Oliver & Nicola Hartley

Project 215034.01

14 February 2025

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GROUNDED EXPERTISE

Document History

Details

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Status	Prepared by	Reviewed by	Date issued
Revision 0	David Smith	Scott Easton	14 February 2025

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Revision 0	Sarah Canavan, Bennett Murada Architects

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		Date
Author		14 February 2025
Reviewer		14 February 2025

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Report on Geotechnical Investigation
Proposed Boat Shed
60 Hudson Parade, Clareville, NSW

1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a geotechnical investigation undertaken for a proposed boat shed at 60 Hudson Parade, Clareville, NSW (the site). The investigation was commissioned by email instructing to proceed dated 29 September 2024 from Oliver Hartley and was undertaken in accordance with Douglas' proposal 215034.01.P.002.Rev0 dated 6/09/2024 and revised fee schedule 215034.01 FS.Rev1. It should be noted that modifications made to the architectural drawings have been considered over the course of the assessment phase for the proposed works.

It is understood that the proposed development of the site includes the construction of a new boat shed at 60 Hudson Parade, Clareville (the site) along the property frontage to Pittwater. It is understood that the finished floor level (FFL) of the new boatshed is RL 2.91, requiring excavations to a depth of approximately 1.2 m, along the boatshed's eastern wall.

It is understood that this report will accompany a Development Application to Northern Beaches (Pittwater) Council and has therefore been compiled to comply with the Council's 'Appendix 5 Geotechnical Risk Management Policy' (GRMP) adopted in December 2014. The site is identified on Council's maps as lying within Geotechnical Hazard Zone H1.

Douglas has previously completed a geotechnical investigation for the site for proposed alterations and additions to the main dwelling on site (report number 215034.00.R.001.Rev0 dated 03/05/2022). This investigation report relates to the proposed boatshed along the western boundary of the site and includes a supplementary investigation which comprised an inspection of the property and its surrounds, together with the drilling of one hand augered borehole and three dynamic cone penetrometer (DCP) tests. The details of the field work are presented in this report, together with comments and recommendations on design and construction practice.

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

2. Site description and geology

60 Hudson Parade, Clareville, is a rectangular shaped, residential lot on the western side of Hudson Parade. The site is located at the toe of a slope that falls to the foreshore of Pittwater. The site covers an area of 1239 m^2 with major plan dimensions of approximately 23 m by 80 m.

The area of the proposed boat shed (the site) is located at the western end of the property, fronting . The site is bound by residential lots to the north and south, the main dwelling of 60 Hudson Parade and beyond that Hudson Parade to the east and Pittwater to the west. The site is currently overgrown with some mature trees noted. In the area of the proposed boat shed the surface levels ranging from about Reduced Level RL 2 m, with respect to the Australian

Height Datum (AHD) at the top of the existing sea wall to approximately RL 4 at the base of the existing stone retaining wall. The average slope across the boatshed area is about , at an average grade of about 25-30%.

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation of Triassic age, which comprises interbedded sandstones, siltstones and shales. Weathered, fine-grained sandstone bedrock consistent with the Newport Formation was exposed at sea-level on the foreshore of Pittwater, along the lower boundary of the property.

3. Field work

3.1 Previous investigation (2022)

Douglas has previously completed a geotechnical investigation for the site for proposed alterations and additions to the main dwelling on site (report number 215034.00.R.001.Rev0 dated 03/05/2022). Two DCP tests (DCP7 and DCP8) were carried out within/near the footprint of the proposed site boatshed. The test locations are shown in the previous geotechnical report. The DCPs were terminated at depths of 1.05 m and 1.5 m, respectively.

3.2 Field work methods

The hand drilling of one borehole and DCP testing was carried out on 3 October 2024 under the supervision of a senior geotechnical engineer.

The borehole (BH1) was drilled within the footprint of the boat shed area, using a 100 mm diameter hand auger to a refusal depth of 1.6 m, which was inferred to be sandstone bedrock.

DCP tests were performed at BH1 and two other locations (DCP 202 and DCP 203), to refusal at depths of between 0.85 m and 2.3 m to provide an indication of the in-situ strength of the soils and to probe for the inferred top of rock. In these tests a cone tipped steel rod is driven into the ground using a standard weight hammer dropping a standard distance. The number of blows required to drive the rod each 150 mm into the ground is recorded and is used to assess the in-situ strength of the soils. Refusal will occur on the top of rock but may also occur on gravel or boulders within the soil profile, so gives the indication of the depth of rock but does not prove it.

The approximate locations of the boreholes and DCPs are shown on Drawing 1 in Appendix B.

The surface levels of the boreholes and DCPs were interpolated from the provided survey. The coordinates of the boreholes were approximated from a geospatial mapping software package.

3.3 Field work results

Details of the subsurface conditions encountered in BH201 during in the current investigation is given in the borehole logs in Appendix C, together with notes explaining descriptive terms and classification methods used.

The general sequence of subsurface materials encountered on the site in the investigations may be summarised as follows:

Fill	Encountered silty sand fill to a depth of 0.4 m; over
Colluvium	Sandy clay, with gravel oof medium to high plasticity, sandstone gravel throughout. The clay was typically of firm to stiff consistency; over
	High plasticity Clay (possibly residual), with a stiff to very stiff consistency to the depth of investigation, on inferred bedrock.

The results of the DCP testing presented in Appendix C suggest that the depth to bedrock is typically between 0.85 m and 2.3 m,. Early refusal may be due to sandstone "floaters" or cobbles located close to the surface. The high DCP values encountered towards the base of some of the DCPs indicates possible weathered rock.

A standing water level was recorded in BH201 at 1.5 m, following drilling and could be associated with perched seepage close to the rock surface. Seepage from perched groundwater is, however, expected to occur along the soil and rock interface and may also occur through fractured zones and joints in the rock. It should be noted that groundwater levels are transient and are affected by climatic conditions and soil permeability and will therefore vary with time.

3.4 Site observations

The site was inspected by an experienced geotechnical engineer on 3 October 2024. Photographs of the site at the time of the inspection are included in Appendix D. The principal observations made during the inspection are:

- The area surrounding the house has been terraced in areas with a series of small, stacked rock retaining walls (see Photos 1-7). Some of the walls are slightly tilting and bulging (see Photos 1 and 4). The movement appears to be due to the wall construction rather than slope instability;
- Some large sandstone boulders (or 'floaters') were observed on the property, probably fallen from cliffs upslope thousands of years previously;
- Medium to high strength, fine grained sandstone bedrock was exposed along the Pittwater foreshore (see Photos 2, 3, and 6); and
- No leaning trees or evidence of creep movement were observed.

4. Proposed development

It is understood, from the provided architectural plans prepared by Bennett Murada Architects (Job number 2130 Drawing number DA_10, Revision 1, dated 29/01/2024), that the proposed works includes the construction of boat shed and slip way access along the lower western boundary of the property, fronting the Pittwater foreshore. It is understood that the finished floor level (FFL) of the new boatshed is RL 2.91, requiring excavations to a depth of approximately 1.2 m, along the eastern wall, supporting the hillslope above.

It is understood that that the existing sea wall along the western site boundary will be preserved.

No structural drawings were provided at the time of preparing this report.

5. Comments

5.1 Interpreted geotechnical model

Based on site observations and previous experience on nearby sites, the interpreted geological model comprises a sloping site, with shallow filling over variable depths of colluvial or residual sandy clay soils (containing some ironstone fragments or layers) to depths in the range of 0.85 m to 2.3 m overlying extremely low to very low strength, interbedded siltstone and sandstone. The top of bedrock is likely to step down the slope beneath the soils rather than be at a consistent depth.

The natural soil and weathered rock profile is most likely mantled by areas of filling in the landscaped or grassed terraces and behind retaining structures.

Standing water was encountered in BH201 at the completion of drilling. Some groundwater seepage should be expected through the soils along the soil/rock interface.

An inferred geological cross-section is shown in Drawing 2, in Appendix C.

5.2 Stability assessment

Inspection of the site and existing structures has indicated no evidence of defects attributable to significant slope instability or settlement in the recent past. However, uncontrolled excavation into the slope or concentrated disposal of stormwater could trigger slope instability. Furthermore, the slope may be susceptible to ongoing long-term gradual downhill creep movements of the near surface soils.

The presence of large floaters on the site indicates past detachment and movement of sandstone blocks from further up slope. However, it is considered that the likelihood of similar natural rock falls affecting the property is “rare to barely credible” for the life of the proposed structure.

The site soils will be susceptible to erosion where disturbed and care will be required to ensure concentrated surface flows are not created.

5.3 Slope risk analysis

The site has been assessed in accordance with the methods of the Australian Geomechanics Society, 2007 (Walker, 2007) and Northern Beaches (Pittwater) Council's GRMP (PC, 2013).

Identified potential hazards within and around the site are summarised in Table 1, together with a qualitative assessment of likelihood of occurrence, consequence and risk to property, resulting from potential slope instability both before and after construction.

Table 1: Property slope instability risk assessment for existing and proposed developments

Hazard	Likelihood	Consequence	Risk
Settlement or movement of footings founded on boulders	Unlikely – if works are carried out in accordance with this report	Medium	Low
Rapid failure of the excavated face during excavation of the proposed boat shed	Unlikely – if works are carried out in accordance with excavation procedures in this report	Minor	Low
Loss of bearing capacity of the footings of the upslope retaining wall due to excavations for the boat shed	Unlikely – if works are carried out in accordance with excavation procedures this report	Medium	Low
Collapse of the existing retaining wall due to excavations for the boat shed	Unlikely – if works are carried out in accordance with excavation procedures this report	Medium	Low
Soil creep causing movement of the boat shed on the property	Unlikely – No significant movement observed on site	Medium	Low
A large boulder toppling and falling onto boat shed from upslope	Unlikely – if works are carried out in accordance with excavation procedures this report	Medium	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 (death) of an individual);

$P_{(H)}$ is the annual probability of the hazardous event occurring (e.g. failure of the excavated face);

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

$P_{(T:S)}$ is the temporal probability (e.g. of the residence being occupied by the individual) at the time of 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 slope instability is summarised in Table 2.

Table 2: Life risk assessment for existing and proposed developments

Hazard	$P_{(H)}$	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	Risk $R_{(LoL)}$
Settlement or movement of footings founded on boulders	10^{-4}	1.0	0.50	0.01	5.0×10^{-7}
Rapid failure of the excavated face during excavation of the proposed boat shed	10^{-4}	0.04	0.50	0.10	2.1×10^{-7}
Loss of bearing capacity of the footings of the upslope retaining wall due to excavations for the boat shed	10^{-4}	0.15	0.30	0.10	5.0×10^{-7}
Collapse of the existing retaining wall due to excavations for the boat shed	10^{-4}	0.15	0.30	0.10	5.0×10^{-7}
Soil creep causing movement of the boat shed on the property	10^{-5}	0.50	0.10	0.20	1.0×10^{-7}
A large boulder toppling and falling onto boat shed from upslope	10^{-5}	0.50	0.10	0.30	1.5×10^{-7}

When compared to the requirements of the Northern Beaches (Pittwater) Council and the AGS, it is considered that the proposed development meets 'Acceptable Risk Management' criteria with respect to life under current and foreseeable conditions.

Provided that the construction is undertaken in accordance with the recommendations contained in this report, construction of the proposed development is not expected to affect the overall stability of the site or negatively influence the geotechnical hazards identified in Tables 1 and 2.

5.4 Excavation conditions

It is expected that the excavations for the proposed boat shed will be through fill, clay and possibly extremely weathered rock, or boulders. It is expected that most of the excavations can be readily excavated using conventional earthmoving equipment but it is likely that some large sandstone boulders will be encountered during excavation and these may need rock hammers to break them down prior to removal.

The excavations should be carried out carefully when close to the existing house and neighbouring houses as excavations can collapse if not adequately supported. Depending on the equipment used to undertake the excavation and the type of footings supporting the neighbouring structures, it is also possible that vibrations generated during excavation could cause cracking of sensitive or brittle structures.

Prior to the commencement of construction activities, it is recommended that dilapidation surveys be undertaken on neighbouring properties to document any existing defects so that any claims for damage due to construction activities can be properly assessed.

5.5 Excavation support

The fill, topsoil, clay and extremely weathered rock on the site cannot stand vertically unsupported.

Excavation for the boat shed will be immediately adjacent to an existing retaining wall footing and underpinning of these footings may be required. Prior to commencing construction, test pits should be excavated to determine the footing system and depth. This will determine if shoring (i.e. underpinning) will be required.

Areas of the proposed excavations for the boat shed will be located about 1 m from the common boundary. There will probably be insufficient room for temporary batters in these areas and shoring will need to be installed before the bulk excavation commences to ensure site stability is maintained.

Any outcrops upslope of the boatshed should be assessed and if disturbed, should be removed, or stabilised (i.e. bolted) prior to commencing earthworks and construction below.

Where room permits and the excavation depth is less than 3 m, temporary batter slopes in the fill and soils should be 1.5 H:1 V (Horizontal: Vertical) or flatter. If surcharge loads are located behind the top of the excavation (e.g. slopes or construction plant), then either a flatter slope angle will need to be adopted or other stabilisation measures will be required.

Retaining walls may be designed using the parameters provided in Table 3. Active earth pressure coefficients (Ka) should be used where the walls may deflect slightly and ‘At Rest’ (Ko) coefficients should be used for shoring required close to existing buildings where any deflections should be minimised.

Table 3: Design parameters for retaining walls

Material	Bulk Density (kN/m^3)	Coefficient of Active Earth Pressure (K_a)	Coefficient of At Rest Earth Pressure (Ko)	Coefficient of Passive Earth Pressure (K_p)
Fill	20	0.4	0.6	N/A
Colluvial or Residual Clay – stiff to very stiff	20	0.3	0.45	3.0
Very low strength rock (Class IV Shale)	22	0.2	0.2	Ultimate passive pressure = 400 kPa*

Note: N/A = not applicable
* the passive pressure given for Class IV Shale is an ultimate value and suitable factors of safety or reduction factors should be applied when using this value.

Lateral pressures due to surcharge loads from adjacent buildings, sloping ground surface, pavements and construction machinery should be included where relevant. Hydrostatic pressure acting on retaining walls should also be included in the design where adequate drainage is not provided behind the full height of the walls.

5.6 Foundations

Based on the results of the borehole and DCP testing, it is expected that most, if not all, of the excavations required for the proposed boat shed will be taken down into clay soils or extremely weathered bedrock.

All new foundations founded in clay soils of at least very stiff strength can be proportioned for a maximum allowable bearing pressure (ABP) of 200 kPa. It is anticipated that soil strata of suitable bearing capacity could be intersected at around 1-1.5 m below existing ground surface levels. Therefore piers, or deepened pad footings, will most likely be required to support the new structures.

Higher bearing pressures (say ABP=700 kPa) would be permitted for piled footings taken to bedrock of at least very low strength (expected to be at various depths in the range of about 1 m to 2.5 m depth), but groundwater inflow into deeper footing excavations could be a construction constraint.

All excavations for proposed footings (or existing footings exposed by the builder) should be inspected by an engineering geologist or geotechnical engineer prior to placement of reinforcement and concrete pouring, so as to confirm that strata of sufficient bearing capacity and stability has been reached.

5.7 Disposal of excavated material

The scope of this investigation did not include sampling and testing for Waste Classification or Contamination Assessment purposes. All excavated materials to be removed off site will need to be disposed of in accordance with current NSW Environment Protection Authority (EPA) regulations. Under the NSW EPA Waste Classification Guidelines (2014) a waste/fill receiving site must be satisfied that materials received meet the environmental criteria for proposed land use. This includes filling and virgin excavated natural materials (VENM), such as may be removed from this site. Accordingly, environmental testing will need to be carried out to classify spoil prior to disposal. The type and extent of testing undertaken will depend on the final use or destination of the spoil, and requirements of the receiving site.

5.8 Acid sulphate soils

Reference to the Hornsby/Mona Vale Acid Sulphate Soil Risk Map (Department of Land and Water Conservation - Edition 2, dated December 1997) indicates the local area to have a “low risk” of ASS.

All bulk and detailed footing excavations proposed on the site will be located upslope (east) of the existing seawall and it is not expected that they will intersect any estuarine soils along the Pittwater foreshore.

Furthermore, field screening and laboratory analysis of the soil samples collected at a similar level on the hillside during an ASS assessment on the adjacent site to south (56 Hudson Parade) did not indicate the presence of any ASS.

It is therefore considered that preparation of an Acid Sulphate Management plan is not required for the proposed development.

5.9 Stormwater disposal and site drainage

It is recommended that gutters and downpipes be installed on the house and proposed development to collect stormwater and pipe it to Pittwater.

6. Conditions relating to design and construction monitoring

To comply with Council conditions and to enable the completion of Forms 2B and 3, required as part of the construction, building and post-construction certificate requirements of the GRMP, it will be necessary for Douglas to:

Form 2B

- review the geotechnical content of all structural drawings.

Form 3

- inspect all new footing excavations for the new works to confirm compliance to design with respect to allowable bearing pressure and stability.

7. Design life and requirements for future geotechnical assessments

Douglas interprets the reference to design life requirements specified within the IGRMP to refer to structural elements designed to retain the subject slope and maintain the risk of instability within acceptable limits.

Specific structures that may affect the maintenance of site stability in relation to the proposed development on this site are considered to comprise:

- existing (and any proposed) stormwater surface drains and buried pipes leading to the stormwater disposal system;
- existing and proposed retaining walls on the site.

In order to attain a structure life of 100 years as required by the Council Policy, it will be necessary for the structural engineer to incorporate appropriate construction detailing and for the property owner to adopt and implement a maintenance and inspection program. A typical program for developments on sloping sites is given in Table 4, overleaf.

Note that the program given in Table 4 is provisional and is subject to review or deletion at the conclusion of construction.

Table 4: Recommended maintenance and inspection program

Structure	Maintenance/ Inspection task	Frequency
Stormwater drains, subsoil drains, pipes and pits	Owner to inspect to ensure that the drains, pipes and pits are free of debris and sediment build-up. Clear surface grates of vegetation/litter build-up.	Every year or following each significant rainfall event.
Existing or proposed retaining walls	Owner to check wall for deviation from as constructed condition.	Every two to three years or following each significant rainfall event.

Where changes to site conditions are identified during the maintenance and inspection program, reference should be made to a relevant professional (e.g. structural engineer or geotechnical engineer).

8. References

- Pittwater Council's Geotechnical Risk Management Policy (2009);
- Australian Geomechanics Society (AGS), Practice Note Guidelines for Landslide Risk Management.

9. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report (or services) for this project at 60 Hudson Parade, Clareville, NSW in line with Douglas' proposal dated 6/09/2024 and acceptance received from Oliver Hartley of Oliver & Nicola Hartley dated 29/09/2024. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Oliver & Nicola Hartley for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other 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/or 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 as a result 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/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical 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 of 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

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

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.

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

Drawings

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	13.02.2025	MN

SCALE: 1:100 @ A3

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

CLIENT:
Oliver & Nicola Hartley

NOTE:
1: Basemap from Metromap (Dated 07.10.2024)
2: Base Drawing from Benette Murada Architects, Job No. 2130, Drawing No. DA-02, Revision 1 (Dated 29.01.2025)

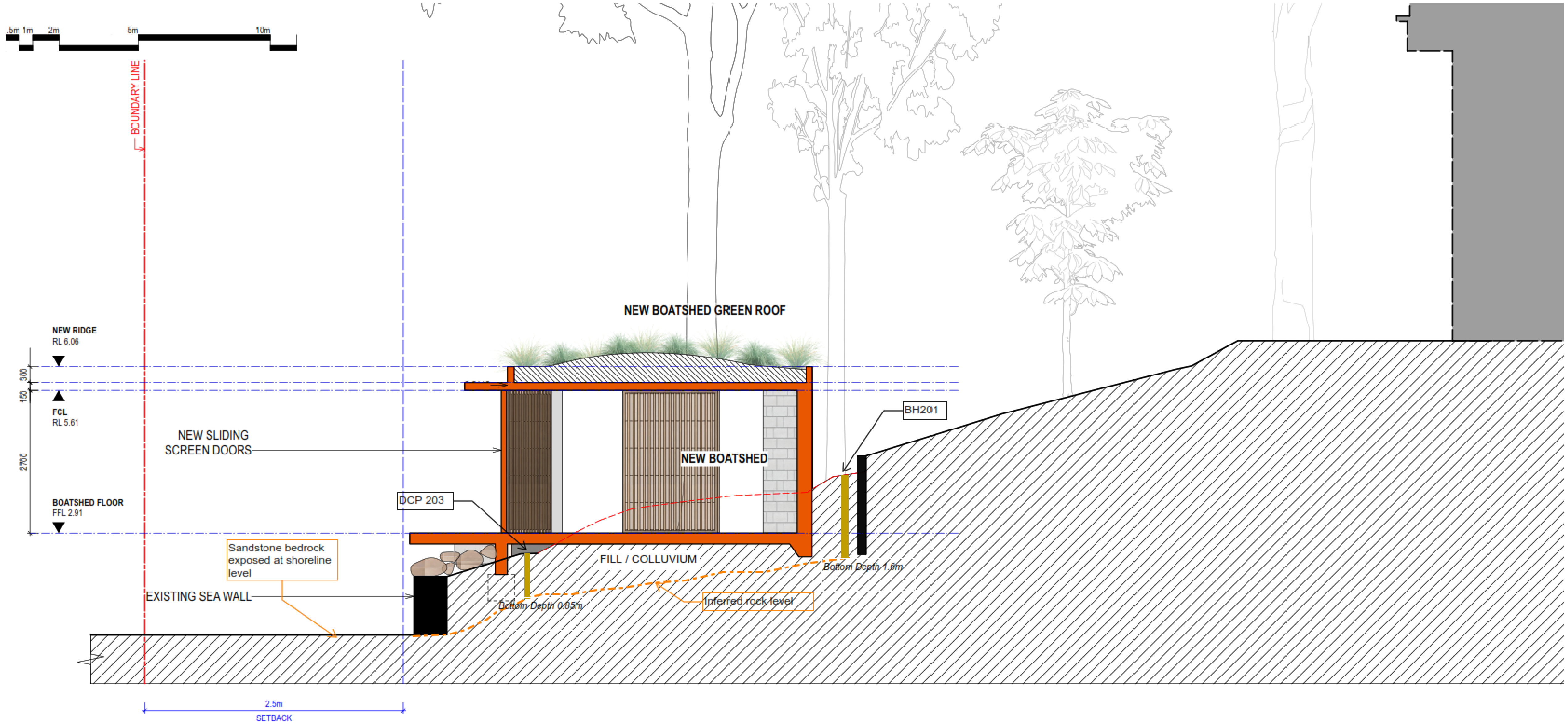
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Alterations and Additions

PROJECT ADDRESS:
60 Hudson Parade, Clareville

DRAWING TITLE:
Test Location Plan

PROJECT NO: **215034.01**
DRAWING NO: **1**
REVISION: **0**



REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	14.02.2025	DS

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

CLIENT:
Oliver & Nicola Hartley

NOTE:
1: Basemap from Metromap (Dated 07.10.2024)
2: Base Drawing from Bennett Murada Architects, Job No. 2130, Drawing No. DA-30, Revision 1 (Dated 29.12.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Boat Shed

PROJECT ADDRESS:
60 Hudson Parade, Clareville

DRAWING TITLE:
Geological Section A-A'

PROJECT NO: **215034.01**
DRAWING NO: **2**
REVISION: **0**

Appendix C

Results of the field work

Terminology, Symbols and Abbreviations

Soil Descriptions

Sampling, Testing and Excavation Methodology

BOREHOLE LOG

CLIENT: Oliver & Nicola Hartley
PROJECT: Proposed Alterations and Additions
LOCATION: 60 Hudson Parade, CLAREVILLE, NSW 2107

SURFACE LEVEL: 3.8 AHD
COORDINATE: E:343640.0, N:6277365.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH201
PROJECT No: 215034.01
DATE: 03/10/24
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
			FILL / Silty SAND, with gravel, trace clay: dark grey-brown; fine to coarse; fine to coarse, angular sandstone gravel; brick fragments, roots.		FILL	PC	M					DCP9/150	5 10 15
	3	0.20	Sandy CLAY (CI-CH), with gravel: pale orange-brown; medium to high plasticity; fine to medium sand; fine to medium, sandstone gravel.		COL	VS St F VSt	w>PL				1		
03/10/24		1.40	CLAY (CH): pale grey; high plasticity. From 1.55m: fine to coarse sand		COL	VSt	w<PL						20 (B) 20/100mm
	2		Borehole discontinued at 1.60m depth. Auger refusal; inferred bedrock.										

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: Hand tools
METHOD: HA(100) to 1.6m
REMARKS: No free groundwater observed whilst augering. Standing water observed at 1.5m 30 min after drilling. Coordinates inferred from site boundaries. RL (AHD) based on provided survey

OPERATOR: Douglas Partners

LOGGED: D Smith
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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Results of Dynamic Penetrometer Tests

Client Oliver & Nicola Hartley
Project Proposed New Boat Shed
Location 60 Hudson Parade, Clareville, NSW

Project No. 215034.01
Date 3/10/2024
Page No. 1 of 1

Test Location	202	203								
Approximate RL of Test (AHD)	~4.5	~2.0								
Depth (m)	**Penetration Resistance** Blows/150 mm									
0 - 0.15	0	0								
0.15 - 0.30	0	1								
0.30 - 0.45	4	0								
0.45 - 0.60	4	2								
0.60 - 0.75	11	20								
0.75 - 0.90	7	15/100								
0.90 - 1.05	5	B								
1.05 - 1.20	3									
1.20 - 1.35	6									
1.35 - 1.50	6									
1.50 - 1.65	6									
1.65 - 1.80	4									
1.80 - 1.95	16									
1.95 - 2.10	28									
2.10 - 2.25	16									
2.25 - 2.40	20/50									
2.40 - 2.55	B									
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 DRS
Checked By STE

Remarks R = Refusal, 24/110 indicates 25 blows for 110 mm penetration
B = Bouncing E = Excavated

Terminology, Symbols and Abbreviations

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:

classification | name | detailed description

(SC) Clayey SAND, trace silt; grey, fine to medium grained

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”.

Soil Descriptions

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	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 Descriptions

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.

Soil Descriptions

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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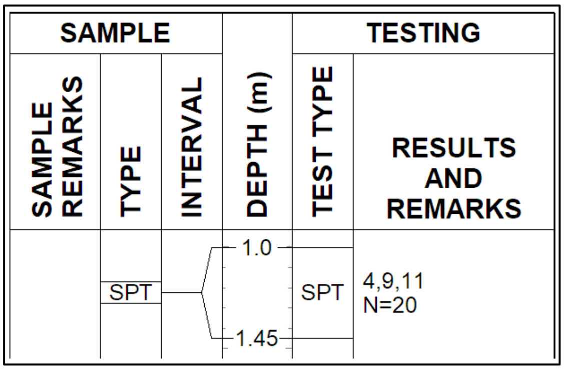
Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Driven Tube sample	DT
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U[1]
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =x blows for y mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS

Field and laboratory testing (continued)

Test Type	Code
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP9/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Air Track	AT
Diatube	DT[1]
Hand auger	HA[1]
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA[1]
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT[1]
Ripping tyne/ripper	R
Rock roller	RR[1]
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON[1]
Mud/blade bucket	MB[1]
Toothed bucket	TB[1]
Vibrocore	VC[1]
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB[1]

[1] – numeric suffixes indicate tool diameter/width in mm

Appendix D

Site Photographs

Photo 1: view of the site, looking north-east

Photo 2: View of the site from the Pittwater foreshore, looking south-east

Douglas PARTNERS	**Site Photographs**	PROJECT:	215034.01
	Proposed Boat Shed	PLATE No:	1
	60 Hudson Parade, Clareville	REV:	0
	CLIENT: Oliver and Nicola Hartley		

Photo 3: View of the site from the Pittwater foreshore, looking south-east

Photo 4: View of exiting retaining walls, looking south-west

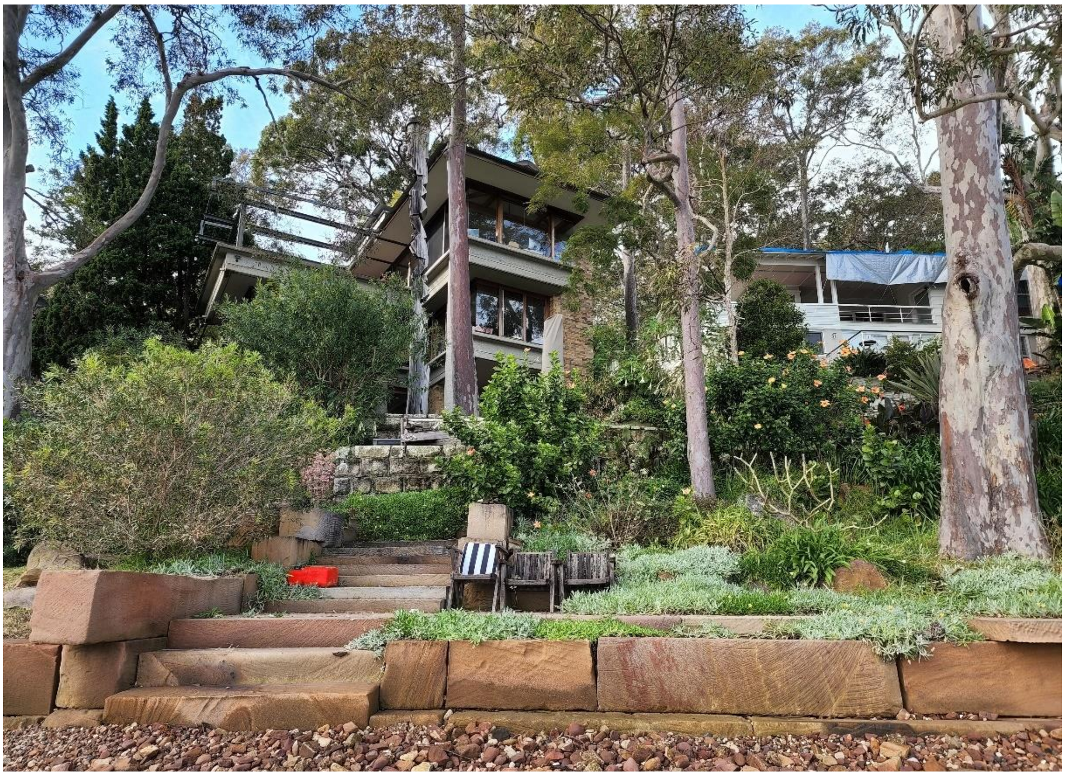


Photo 5: View of the site from the Pittwater foreshore, looking east

Photo 6: View of the Pittwater foreshore, looking south

Douglas PARTNERS	**Site Photographs**	PROJECT:	215034.01
	Proposed Boat Shed	PLATE No:	3
	60 Hudson Parade, Clareville	REV:	0
	CLIENT	Oliver and Nicola Hartley	

Appendix E

Risk Assessment

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1 – To be submitted with Development Application

Development Application for Oliver and Nicola Hartley
Name of Applicant
Address of site 60 Hudson Parade, Clareville

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Scott Easton *on behalf of* Douglas Partners Pty Ltd
(Insert Name) (Trading or Company Name)

on this the 14 February 2025 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $10million.

I:
Please mark appropriate box

- ☐ have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☑ am willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009
- ☐ have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.
- ☐ have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- ☐ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.
- ☐ have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: 60 Hudson Parade, Clareville - Geotechnical Investigation. Project No. 215034.01.R002.Rev0

Report Date: February 2025
:
Author: David Smith

Author's Company/Organisation: Douglas Partners Pty Ltd

Documentation which relate to or are relied upon in report preparation:

Architectural Plans - Bennett Murada Architects

I am aware that the above Geotechnical Report, prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ensuring that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature ……………………………………………………………………..

Name Scott Easton

Chartered Professional Status CPEng

Membership No. 1371997

Company Douglas Partners Pty Ltd

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1(a) - Checklist of Requirements For Geotechnical Risk Management Report for Development Application

Development Application for Oliver and Nicola Hartley
Name of Applicant
Address of site 60 Hudson Parade, Clareville

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report. This checklist is to accompany the Geotechnical Report and its certification (Form No. 1).

Geotechnical Report Details:

Report Title: 60 Hudson Parade, Clareville - Geotechnical Investigation. Project No. 215034.01.R.002.Rev0
Report Date: February 2025
Author: David Smith
Author's Company/Organisation: Douglas Partners Pty Ltd

Please mark appropriate box

- ✓ Comprehensive site mapping conducted 3 October 2024 (date)
- ✓ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1:200 (as appropriate)
- ✓ Subsurface investigation required
  - ∍ No Justification ……………………………………………...
  - ✓ Yes Date conducted 3 October 2024……………………….
- ✓ Geotechnical model developed and reported as an inferred subsurface type-section
- ∍ Geotechnical hazards identified
  - ✓ Above the site
  - ✓ On the site
  - ∍ Below the site
  - ∍ Beside the site
- ✓ Geotechnical hazards described and reported
- ✓ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
  - ✓ Consequence analysis
  - ✓ Frequency analysis
- ✓ Risk calculation
- ✓ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ✓ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ✓ Assessed risks have been compared to "Acceptable Risk Management" criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009
- ✓ Opinion has been provided that the design can achieve the "Acceptable Risk Management" criteria provided that the specified conditions are achieved.
- ✓ Design Life Adopted:
  - ✓ 100 years
  - ∍ Other ……………………………………………
    specify
- ✓ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified
- ✓ Additional action to remove risk where reasonable and practical have been identified and included in the report.
- ∍ Risk assessment within Bushfire Asset Protection Zone.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for ensuring that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure, taken as at least 100 years unless otherwise stated, and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

Signature ……………………………………………………………
Name …Scott Easton…………………………………………
Chartered Professional Status………CPEng……………………
Membership No. ………1371997…………………………..
Company Douglas Partners Pty Ltd………………………