Douglas PARTNERS

GROUNDED EXPERTISE

Specialist Advice

Report on Geotechnical Investigation

Proposed Mixed Use Development

253-265 Pacific Highway, North Sydney NSW

Prepared for Legacy Property Pty Ltd

Project 233323.00

23 June 2025

Douglas Partners
GROUNDED EXPERTISE

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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	Date
Author	23 June 2025
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Report on Geotechnical Investigation
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1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a geotechnical investigation undertaken for a proposed mixed use development at 253-265 Pacific Highway, North Sydney NSW (the site). The investigation was commissioned by email dated 30 July 2024 from Peter Navratil of Legacy Property Pty Ltd and was undertaken in accordance with Douglas' proposal 233323.00.P.001.Rev0 dated 10/12/2024.

The aim of the investigation was to assess the subsurface conditions across the site to support the State Significant Development Application (SSDA) and assist the planning and design of the proposed development.

The SSDA (SSD – 84416958) seeks approval for: the demolition of existing buildings at 253-265 Pacific Highway, and the retention and reuse of the existing local heritage item building at 265 Pacific Highway; the construction of a part 10, part 13 storey, mixed use, shop top housing development including: a 2 storey podium consisting of ground and first storey commercial tenancies, ground level communal open space and deep soil landscaping at 265 Pacific Highway; a tower above consisting of 35 residential apartments and communal roof garden; excavation of four levels of basement level car parking and servicing; and the stratum and strata subdivision of the building.

As part of the proposed residential component, 10 affordable housing apartments are proposed to be provided under Chapter 2 – Infill Affordable Housing under the State Environmental Planning Policy (Housing) 2021 (Housing SEPP).

The Secretary's Environmental Assessment Requirements (SEARs) for the proposal were issued on 29 May 2025. This report addresses Item 12 of the SEARs (refer geotechnical assessment).

The investigation included the drilling of four boreholes, installation of three groundwater monitoring wells, in situ testing and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations relevant to the proposed development.

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

2. Site Description

The site is occupied by the properties of 253, 255-259, 261-263 and 265 Pacific Highway.

The site covers a rectangular shaped area of approximately 1098 m^2 and is currently occupied by four separate buildings with two individual single level basements, with the buildings.

The site is situated in an area of mixed commercial and residential land use with the general surrounds occupied by similar buildings of between two and three storeys, with newer buildings generally exceeding two storeys. In the immediate area, the site is bounded by:

- West Street, followed by two storey brick building to the North;
- Church Lane, followed by single and two storey residential dwellings to the East;
- Pacific Highway to the West;
- Two storey brick building, followed by Mclaren Street to the South.

Ground surface levels in the general surrounds (i.e. Pacific Highway and Church Lane) typically fall from the northern site boundary, at approximately RL 91 m AHD to the southern boundary of the site, at approximately RL 86 m AHD.

Documents provided by Legacy to Douglas, indicate that the northbound tunnel of the proposed Western Harbour Tunnel (WHT) runs directly below the site at a depth of approximately 41 m to 43 m (to the tunnel crown/obvert). At the time of writing this report (Feb. 2025), it is understood that road headers are excavating the tunnel almost directly below the site, and moving towards the east. A construction zone of up to 10 metres exists around the main line tunnels to allow for services, rock anchors and other tunnel support facilities.

3. Published Data

3.1 Geology

Reference to the Sydney 1:100,000 Geological Series Sheet indicates that the site is underlain by the Ashfield Shale formation, typically consisting of black to dark grey shale and laminite of Triassic age. This is underlain by Hawkesbury Sandstone of the Triassic Period which typically consists of medium to coarse grained quartz sandstone with minor siltstone and laminite lenses.

3.2 Hydrogeology

A groundwater bore search of the WaterNSW and Douglas database indicates no registered bores within 250 m of the site.

3.3 Soil Landscape

Reference to the Sydney 1:100,000 Soil Landscape Sheet indicates that the site is located within the Blacktown soil landscape.

The Blacktown soil landscape is a residual soil landscape formed on low hills and rises underlain by the Wianamatta Group shales and Hawkesbury shale with slope gradients typically of <5%. These soils are typically shallow on crests and moderately deep on slopes and along drainage lines and consist predominantly of clay. The soils are moderately reactive, have a moderate to high erosion hazard and are associated with poor drainage.

3.4 Acid Sulfate Soils

The 1:25,000 Acid Sulfate Soil Risk Map (1994-1998, NSW Department of Environment and Climate Change) indicates that the site is located within an area not known to contain acid sulfate soils (ASS).

The site is located at levels greater than 86 m AHD, meaning that ASS is not considered a risk.

4. Field Work

4.1 Field Work Methods

Field work for the geotechnical investigation boreholes was carried out on 13-14 January 2025 (BH04) and between 20-24 January 2025 (BH01-BH03), and included:

- Electronic scanning for buried services at the proposed borehole locations;
- Drilling of three boreholes (BH01 to BH03) using a hand portable drilling equipment (Proline). The boreholes were drilled through the concrete using Diatube equipment. The soil profile was manually excavated using hand tools to depths of between 0.85 m and 1.9 m before being continued through the rock profile to depths of between 13.1 m and 18.1 m using NMLC drilling techniques to obtain continuous core samples of the bedrock;
- Drilling of one borehole (BH04) using a bobcat mounted drill rig. The borehole was drilled through the concrete using Diatube equipment. The soil profile was drilled using auger and wash bore methods to a depth of 3.1 m before being continued through the rock profile to a depth of 19.9 m using NMLC methods to obtain continuous core samples of the bedrock;
- Standard penetration tests (SPTs) were undertaken at selected depths within BH04 to collect samples for laboratory testing and provide information on soil consistency. Due to site constraints within the remaining boreholes, Dynamic cone penetrometer (DCP) tests were undertaken to provide information on soil consistency;
- The collection of soil samples from the boreholes for laboratory testing for aggressivity, Atterberg Limits, Linear Shrinkage and field moisture content;
- The collection of continuous rock samples from the boreholes to undertake point load strength testing;
- Logging of encountered sub-surface conditions by an experienced geotechnical engineer from Douglas in accordance with AS1726:2017;
- Installation of groundwater monitoring wells in three boreholes upon completion (BH01, BH02 and BH04);
- Development of the groundwater monitoring wells after installation by either pumping the well dry or pumping out at least three well volumes of water;
- Groundwater permeability testing via rising and falling-head tests at the three well locations and long-term groundwater level monitoring using dataloggers; and,
- Backfilling of the non-well borehole (BH03) with sand and cement upon completion and finished with quickset concrete, matching the existing concrete pavement thickness.

Coordinates and surface levels for test location BH04 were determined using a differential Global Positioning System (dGPS) receiver, which has an accuracy of approximately ±0.1 m. Coordinates and surface levels for the remaining test locations (BH01 to BH03) were provided in survey drawings provided by the client (drawing ref: 170713, rev 4, issued 12/02/25). Coordinates are in GDA2020/MGA Zone 56 format (Geocentric Datum of Australia 2020 base with Map Grid of Australia projection) and levels are relative to Australian Height Datum (AHD).

The approximate locations of the boreholes are shown on the Test Location Plan (Drawing 1) in Appendix B.

4.2 Field Work Results

A summary of the subsurface conditions encountered at the boreholes is presented below. Detailed descriptions of the subsurface conditions encountered are given in the borehole logs included in Appendix C, along with photographs of the rock core. Notes defining classification methods and descriptive terms used in the preparation of the borehole logs are included within Appendix A.

The general strata encountered in the boreholes is summarised as follows:

Concrete Pavement:	Concrete slabs at the surface of all test locations to depths of between 0.05 m and 0.15 m.
Fill:	Encountered below the concrete slabs at all test locations to depths of between 0.25 m and 0.5 m. In BH01 and BH02, the fill comprised of fine to medium grained sand with fine to coarse igneous, sandstone and asphalt gravel inclusions. In BH03 and BH04, the fill comprised of medium to high plasticity clay, with igneous gravel and brick fragment inclusions.
Residual Clay:	Encountered below the fill at all bores to depths of between 0.7 m to 4.9 m. Generally grey and pale grey, medium plasticity and in a stiff to very stiff condition, grading to hard extremely weathered material with depth.
Siltstone:	Encountered at all test locations underlying the residual clay to depths of between 7.4 m and 11.4 m. Generally dark grey, highly to slightly weathered and very low to low strength, grading to fresh and medium and high strength with depth.
Sandstone:	Encountered at all test locations underlying the siltstone to borehole termination depths between 13.1 m and 19.9 m. Generally medium to coarse grained, pale grey medium to high strength. A distinct bed of medium and high strength siltstone was encountered within the sandstone, typically at depths of between 10.8 m to 15.4 m and between 0.8 m to 1.5 m thick.

Groundwater observations from the constructed wells are summarised in Table 1. Water level loggers were installed in each of the wells from January 2025 to June 2025 for long term monitoring of groundwater levels. Graphs showing the results of the groundwater level monitoring are provided in Appendix D. It should be noted that groundwater levels are transient and are affected by climatic conditions, wet weather and soil permeability, and will therefore vary with time.

Table 1: Summary of Groundwater Observations

Test Location	Highest GW Level During Monitoring Period (m depth(RL))	Lowest GW Level During Monitoring Period (m depth(RL))
BH01	4.7 (85.7)	5.8 (84.6)
BH02	1.3 (86.1)	1.6 (85.8)
BH04	2.4 (84.1)	3.4 (82.9)

Rising head permeability testing was undertaken in each of the monitoring wells to estimate the mass permeability of the bedrock unit types. The tests involved removing water from the monitoring well (i.e. pumping the well out) and then measuring the rate of recharge. The results of the permeability testing using Hvorslev's (1951) method are provided within Appendix D. The permeability testing results are summarised in Table 2. The measured hydraulic conductivity values are similar to typical values commonly seen within similar rock formations in Sydney (Pells et. al., 2018, *Classification of Sandstones and Shales in the Sydney Region*).

Table 2: Summary of Permeability Testing Results

Test Location	Material	Hydraulic Conductivity (m/s)
BH01	Medium and High Strength Sandstone	1.4×10^{-8}
BH02	Medium and High Strength Sandstone	4.9×10^{-8}
BH04	Low to Medium Strength Siltstone	3.4×10^{-7}

5. Laboratory Testing

5.1 Soil

Laboratory testing was carried out on three (3) soil samples to determine the geotechnical soil characteristics. Geochemical testing was undertaken on six (6) soil samples to determine the exposure classification for buried concrete and steel elements.

Table 3: Summary of Geotechnical Test Results

Test Location	Material	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Linear Shrinkage (%)	Field Moisture Content (%)
BH03	FILL/CLAY	0.1-0.25	33	22	11	-	19.4
BH04	Residual CLAY	1.0-1.45	46	25	21	9.5	19.3
BH04	Residual CLAY	2.5-2.95	36	26	10	6.0	18.8

Table 4: Summary of Chemical Test Results

Test Location	Material	Depth (m)	Conductivity (µS/cm)	pH	Cl (ppm)	SO_4 (ppm)
BH01	FILL/SAND	0.2-0.4	130	7.2	10	56
BH02	FILL/GRAVEL	0.15-0.4	230	9.9	<10	20
BH02	CLAY	0.4-0.7	140	8.4	26	65
BH03	CLAY	0.8-0.9	73	6.0	35	75
BH04	CLAY	1.00-1.45	41	5.1	<10	48
BH04	CLAY	2.50-2.95	47	5.6	10	53

Notes: Cl = Chloride ion concentration SO_4 = Sulphate ion concentration ppm = parts per million

Table 5: Summary of Salinity Test Results

Sample ID	Depth (m)	Sample Type	Soil Texture	EC (µS/cm)[1]	ECe (dS/m)	Classification
BH01	0.2-0.4	FILL/SAND	Sand	130	2.2	Slightly Saline
BH02	0.15-0.4	FILL/GRAVEL	'Sand'	230	3.9	Slightly Saline
BH02	0.4-0.7	CLAY	Medium Clay	140	<2	Non-Saline
BH03	0.8-0.9	CLAY	Medium Clay	73	<2	Non-Saline
BH04	1.00-1.45	CLAY	Medium Clay	41	<2	Non-Saline
BH04	2.50-2.95	CLAY	Medium Clay	47	<2	Non-Saline

Notes: 1 .EC from aggressivity suite testing

6. Proposed Development

From drawings provided (Nettleton, June 2025), it is understood that the proposed development will include the demolition of most of the existing buildings on the site, followed by the construction of a mixed-use development. The proposed development will consist of a part 10 and part 13 level building with a 4-level basement car park. The proposed building will include residential, commercial and retail floors.

It is understood from the provided architectural drawings that the lowest basement level has been designed for a finished floor level (FFL) of RL 74.6 m AHD and RL 76.1 m AHD for the northern and southern half of the development respectively. Bulk excavation (assumed to be 0.5 m below FFL) is therefore estimated to depths of between 11 m and 16 m below existing surface levels.

7. Comments

7.1 Geotechnical Model

The geotechnical model is illustrated in the Interpreted Geotechnical Cross Section A-A' in Drawing 2, in Appendix B. The interpreted model can be summarised as follows:

- **Unit 1 - Fill:** typically sandy/granular and clayey in the northern and southern portions of the development respectively, including surficial concrete pavements;
- **Unit 2 – Residual Clay:** typically grey, medium to high plasticity and stiff to very stiff, grading to hard with depth;
- **Unit 3 – Siltstone (Very Low and Low Strength):** dark grey with occasional sandstone laminations and beds, typically slightly weathered, fractured and very low to low strength;
- **Unit 4 – Siltstone (Medium and High Strength):** dark grey with occasional sandstone laminations and beds, typically fresh, slightly fractured to unbroken and medium and high strength;
- **Unit 5 – Sandstone (Medium and High Strength):** fine to coarse grained, pale grey with occasional dark grey siltstone laminations and beds, fresh, unbroken and medium and high strength.

Table 6 summarises the levels at which different materials were encountered in the boreholes.

Groundwater was measured at around RL 83 to 86 m AHD within the monitoring wells and was within the Unit 4 rock, indicating a groundwater flow direction towards the south-south-east, generally falling with ground surface levels. It is likely that the measured groundwater is associated with perched water along the rock surface and within joints/fractures in the rock and not a regional groundwater table.

It is noted that groundwater levels will fluctuate with weather and climactic conditions and may temporarily rise following periods of prolonged rainfall. Previous experience suggests that groundwater levels may rise by at least 1 m following prolonged, heavy rainfall. Groundwater levels may also be impacted by human activities such as dewatering.

Table 6: Summary of Material Strata Levels

Stratum	Depth (m) [RL (m, AHD)] of Top of Stratum			
	BH01	BH02	BH03	BH04
Surface Level	[90.4]	[87.4]	[86.3]	[86.5]
Fill (Unit 1)	0.0	0.0	0.0	0.0
Residual Clay (Unit 2)	0.4 [90.0]	0.4 [87.0]	0.25 [86.1]	0.5 [86.0]
Siltstone – Very Low and Low Strength (Unit 3)	0.7 [89.7]	0.7 [86.7]	2.15 [84.2]	3.1 [83.4]
Siltstone – Medium and High Strength (Unit 4)	8.0 [82.4]	5.5 [81.9]	4.9 [81.4]	6.7 [79.9]
Sandstone – Medium and High Strength (Unit 5)	11.4 [79.0]	9.3 [78.2]	7.4 [78.9]	7.5 [79.1]
Base Depth of Bore	18.1 [72.3]	16.0 [71.4]	13.1 [73.2]	18.1 [68.4]

7.2 Ground Vibration and Dilapidation Surveys

During excavation, construction vibration may be generated which, if not controlled, could possibly result in damage to nearby structures and underground services. It will therefore be necessary to use appropriate methods and equipment to keep ground vibrations for 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, brick, sandstone blocks, 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. A vibration limit of 8 mm/sec peak particle velocity (PPVi) is considered appropriate for anything not considered a ‘sensitive structure’.

Ground vibration can be strongly perceptible to humans at levels above 3 mm/s PPVi. This is generally much lower than the vibration levels required to cause structural damage to buildings. The Australian Standard AS2670.1-2001 “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 component PPVi for human comfort.

As the magnitude of vibration transmission is site specific, it is recommended that a vibration trial be carried out at the commencement of rock excavation. These trials may indicate that smaller or different types of excavation equipment are required to reduce vibrations to acceptable levels.

To reduce the risk of damage to nearby structures caused by vibrations, it is suggested that a vibration monitoring plan (VMP) be provided (prior to demolition commencing) by a geotechnical consultant. A VMP (commonly also referred to as GMP or GVMP) provides recommendations such as number of vibration monitors required and their locations, vibration limits for sensitive receivers and monitoring and response criteria. We note that while it is never possible to guarantee that vibration related damage will not occur to structures, that if the VMP is adopted and implemented correctly during the demolition, excavation and piling stages of the works, then the likelihood of damage to neighbouring buildings (caused by vibration) is reduced.

Dilapidation surveys should be carried out on adjacent buildings and sensitive structures that may be affected by excavation and vibrations. The dilapidation surveys should be undertaken before construction commences in order to document any existing defects, so that any claims for damage due to construction related activities can be accurately assessed. Further comments are provided in Section 7.10, about the possible impact assessments required by Sydney Water and Transport for NSW.

7.3 Excavation

7.3.1 Excavation Conditions

Bulk excavation levels have been assumed to vary from approximately RL 74.1 m AHD at the northern boundary to RL 75.6 m AHD at the southern boundary (i.e. 0.5 m below FFL), corresponding to excavation depths of approximately 16 m and 11 m respectively. Note that this does not account for additional excavation required for ancillary structures such as sumps, footings or lift pit overruns.

Fill, residual soils and fractured low strength siltstone should be readily removed using conventional hydraulically operated earthmoving equipment with bucket attachments. Medium and high strength siltstone and sandstone will likely require rock saws, rotary mill heads or hydraulic breaking equipment for effective excavation.

Excavation productivity within medium and high strength siltstone and sandstone is likely to be low. The excavation rate that can be achieved within this medium and high strength bedrock varies considerably and is dependent upon the degree of fracturing, rock strength, and the type of machinery being used. Excavation tenderers should be required to make their own assessment of the equipment required to carry out the work and should inspect the borehole rock cores.

During excavation, locked-in stresses within the rock are released which generally results in lateral movement of the rock mass face towards the excavation, dragging the soil (and any shoring) with it as movement occurs. Horizontal stress relief movements (towards the excavation) are typically between 0.5 mm and 1 mm per vertical metre depth of excavation for the rock units in Sydney. Note that this is only relevant for Unit 4 and below.

Maximum movement typically occurs at the top of the midpoint of the face and reduces to near zero in the corners of the excavation. Back from the crest of the excavation, movement can occur over a distance of up to three times the excavated rock depth with an initial reduction of approximately 1 to 1.5 mm per metre, reducing with distance from the face. This differential movement will give rise to strain in both the rock mass and the soil beyond the excavation. Most of the movement would be expected to occur progressively during the excavation. Heave may occur where relatively thin beds of competent rock is left in the base (bed separation due to buckling).

Stress relief movements have the potential to crack adjacent buildings close to the excavation and may also increase loads on any ground support anchors installed. The effects of this movement on the various buildings or infrastructure (i.e. buried services) should therefore be assessed by a structural engineer. Appropriate allowance should be made for the potential repair of these structures, should it be required.

7.3.2 Material Disposal

It should be noted that any off-site disposal of spoil will generally require assessment for re-use or classification in accordance with the current *Waste Classification Guidelines* (NSW EPA, 2014), or as directed by the Contamination Consultant (JBS&G). 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.

It should be noted that some receiving sites, such as those operated by Councils or other bodies might have their own special environmental criteria to be met before admitting any materials. The scope of this investigation did not include sampling and testing for Waste Classification or Contamination Assessment purposes.

7.4 Excavation Support

Excavation will need to be carried out with due consideration of existing structures. Vertical excavations within the soil and siltstone profile (Unit 1 to Unit 4) will require both temporary and permanent lateral support during and after excavation, and therefore shoring will be required around the perimeter.

7.4.1 Batter Slopes

Suggested temporary and permanent batter slopes for unsupported excavations within the residual clay and siltstone profile up to maximum heights of 3 m are shown in Table 7. If surcharge loads are applied near the crest of the batter, further geotechnical assessment will be required, likely necessitating flatter battle angles or stabilisation (e.g. use of rock bolts or soil nails).

Table 7: Recommended Batter Slopes for Exposed Material

Unit	Material	Maximum Temporary Batter Slope (H : V)	Maximum Permanent Batter Slope (H : V)
1	Existing Filling	1.5 : 1	2 : 1**
2	Residual Clay	1 : 1	2 : 1**
3	Siltstone (VL-L)	0.75 : 1*	1 : 1*
4	Siltstone (M-H)	0.5 : 1*	0.75 : 1*
5	Sandstone (M-H)	Vertical*	Vertical*

Note: * Subject to jointing assessment by experienced Geotechnical Engineer/Engineering Geologist.
** Permanent batters in soil may need to be reduced to 3H: 1V to facilitate maintenance of grassed slopes.

Excavated faces within medium strength or better sandstone are generally self-supporting, except where adversely oriented discontinuities are present. All vertical rock faces in sandstone **must be** inspected by a geotechnical engineer or engineering geologist every 1.5 m maximum drop to check for adversely oriented joints and unstable wedges to assess whether additional temporary or permanent support measures are required.

Support may include dowels and shotcrete if the rock is highly fractured or if highly weathered seams are present, or rock bolts where adverse joints form potentially unstable wedges. If support elements (rock bolts, dowels, anchors etc.) are required beyond the site boundaries, then permission will be required from the neighbours.

7.4.2 **Retaining / Shoring Walls**

Where batter slopes cannot be accommodated, an anchored soldier pile wall may be a suitable approach for providing excavation support for Units 1 to 4 (i.e. everything other than M-H Sandstone). Reinforced shotcrete infill panels would be required between each of the piles and should be completed at every 2.0 m (maximum) vertical drop in excavation level before additional excavations can be undertaken. Regular inspections by a geotechnical professional should be carried out following each progressive drop in excavation level, and prior to construction of the infill panels, to confirm that the conditions encountered are consistent with the design assumptions.

Typically, a soldier pile wall could be constructed with piles at approximately 1.5 m to 2.4 m centre spacings (sizing/spacing to be confirmed by Structural Engineer). Any significant structural loads requiring allowable bearing pressures of greater than 1000 kPa (which should be treated as foundation piles) should be transferred with piles or columns to below the bulk excavation level.

Solider piles could either be taken down to below the BEL or terminate at a higher level (i.e. founded on Unit 5 sandstone). Where solider piles are not embedded below the BEL, a toe bolt/anchor (in addition to ground anchors or props) would be required to resist rotation of the pile (i.e. min. two fixed points). If adverse joints occur in the Unit 5 sandstone below the piles founded at higher level then additional support or underpinning will be required. The lowest risk option is to take piles to below the BEL. An alternative could be to take every say 3rd or 4th pile to below BEL to provide redundancy, particularly along the east and west boundaries where the risk of adverse jointing is higher.

It is suggested that preliminary design for cantilevered shoring walls or walls restrained with a single row of anchors or propping be based on a triangular earth pressure distribution, with the lateral earth pressure being determined as a proportion of the vertical stress as given in the formula below, noting that multiple rows of anchors will likely be required (see below for further comment):

$\sigma_z = K z \gamma$, where σ_z = Horizontal pressure at depth z (kPa)

K = Earth pressure coefficient

z = Depth (m)

γ = Unit weight of soil or rock (kN/m^3)

Table 8: Recommended Design Parameters for Retaining Walls

Unit	Material	Unit Weight (kN/m^3)	Earth Pressure Coefficient		Ultimate Passive Earth Pressure (kPa)[1]
			Active (K_a)	At Rest (K_0)	
1	Existing Filling	20	0.4	0.6	-
2	Residual Clay	20	0.3	0.45	200
3	Siltstone (VL-L)	22	0.25	0.4	400
4	Siltstone (M-H)	24	0.2	0.3	3,500
5	Sandstone (M-H)	24	0[2]	0[2]	6,000

Notes: [1]Only below bulk/detailed excavation level as well as any perimeter drains or adjacent pits or tanks.
[2]Subject to jointing assessment by experienced Geotechnical Engineer/Engineering Geologist.
Strength: VL = Very Low L = Low M = Medium H = High

The 'At Rest' coefficient (K_0) should be used where retaining walls are close to existing structures, to minimise ground (and wall) movements. Where small movements of retaining walls are acceptable, they may be designed for the 'active' (K_a) condition.

Where multiple rows of anchor/support are used a rectangular earth pressure distribution equal to 4H kPa (where H, in metres, equals the depth to the top of self-supporting Unit 5 rock) can be used, where there are no movement-sensitive structures within the influence zone behind retaining walls,. Where the wall movement is to be minimised (i.e. close to adjacent structures, buildings, or services) the lateral earth pressure can be calculated using 6H kPa. For movement sensitive structures, where it is critical that deformation is controlled, it may be necessary to calculate the pressure using 8H kPa.

Note that these earth pressure distributions are 'pressure envelopes' selected to ensure that no row of anchors is overloaded during the temporary/permanent support phase. The actual magnitude and distribution of lateral earth pressures for the building in its final (long-term) condition may differ from the uniform distributions given above. The final condition earth pressures can be assessed using numerical methods at the appropriate time during the detailed design phase.

In all cases, additional surcharge loads such as new and existing footings, construction loads, etc., must be allowed for in the design, applied as a rectangular earth pressure distribution over the depth of influence.

The earth pressure loading described above does not include earthquake loads or hydrostatic pressures. Unless positive drainage measures are incorporated to prevent water pressure buildup behind the walls, full hydrostatic head should be allowed for in the design, while at the same time the unit weight of the soils can be reduced to account for the buoyant condition.

The shoring system will need to be designed to consider the possibility that 45° joints/faults in Unit 3 and 4 rock (i.e. Ashfield Shale) will 'daylight' within the sidewall of the excavation leading to wedges of rock requiring support by the temporary (and permanent) shoring/ retaining structures. Sufficient anchoring of the shoring wall should be undertaken to prevent movements along 45° defects within Unit 3 to 4 rock, even though there is a very low probability that a joint would run the full length and depth of both units. As a guide, an anchor force equal to $4.2H^2$ kN per meter length of wall would be required for a continuous 45° joint daylighting at the interface between the Ashfield Shale (Unit 4) and Hawkesbury Sandstone (Unit 5). This mechanism usually only governs shoring design for deeper excavations in stronger shale.

The eastern and western sides of the excavation are oriented just off parallel with the major joint sets in Sydney and steeply dipping joints should be conservatively expected in the sandstone. Although the northern and southern elevations do not coincide with the strikes of the major joint sets, adversely dipping joints should still be expected. Some allowance for stabilisation of large rock wedges should be made and this risk will be higher where shoring piles are founded at higher levels. These joints are typically about near vertical to 70° above horizontal and have been encountered on excavation projects in North Sydney.

Staged excavation and inspection by a suitably qualified geotechnical engineer or engineering geologist will be required to confirm that the rock in front of the wall is not adversely affected by discontinuities (example shown in Figure 1), especially where passive resistance is to be relied upon.

Figure 1: Example 'feathered edge' in Sandstone excavation sidewall

Where solider piles do not extend to the base of the excavation, it is possible that localised siltstone beds within Unit 5 will need to be protected to limit the potential of fretting/unravelling and undermining of the rock mass above. Additionally, shotcrete or mesh may be required where beds/seams of extremely or very low strength rock are encountered within higher strength rock, secured with rock bolts, dowels and pins, as required.

7.4.3 **Ground Anchors**

The design of temporary and permanent ground anchors/rock bolts for the support of excavations and/or shoring systems may be carried out using the maximum bond stresses given in Table 9.

Table 9: Suggested Ground Anchor Design Parameters

Unit	Material Description	Maximum Allowable Bond Stress (kPa)	Maximum Ultimate Bond Stress (kPa)
3	Siltstone (VL – L)	150	300
4	Siltstone (M – H)	400	800
5	Sandstone (M – H)	1,000	2,000

Notes: Strength: VL = Very Low L = Low M = Medium H = High

The parameters given in Table 9 assume that the drilled holes are clean and adequately flushed. The anchors should be bonded behind a line drawn up at 45 degrees from the base of the shoring, and "liftoff" 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 then ‘locked-off’ at no higher than 75% of the working load. Where ground anchors cross site boundaries, the permission of neighbouring property owners or road authorities should be sought.

The parameters given assume that the anchor holes are clean and adequately flushed, with grouting and other installation procedures carried out carefully and in accordance with good anchoring practice. Careful installation and close supervision by a geotechnical specialist may allow increased bond stresses to be adopted during construction, subject to testing.

In normal circumstances the building will restrain the basement excavation over the long term and therefore ground anchors are expected to be temporary only.

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

7.5 Footings

It is understood that pad footings are currently being considered to support the building column loads. All structures should be uniformly founded on a consistent material.

Based on the conditions encountered across the test locations, it is expected that the bulk excavation level (RL 74.4 m and RL 75.9 m AHD) will encounter medium to high strength sandstone (Unit 5) noting that a bed of medium to high siltstone was encountered at around RL 73 to RL 75 m and may be exposed or within the zone of influence of the pads. If footings are founded directly above or within the siltstone bed then the parameters for Unit 4 rock should be considered.

Suggested parameters for footing design are outlined in Table 10.

Table 10: Suggested Footing Design Parameters

Unit	Material	Modulus, E (MPa)	End Bearing (kPa)		Shaft Adhesion[1] (kPa)	
			Allowable	Ultimate	Allowable	Ultimate
3	Siltstone (VL-L)	100	1,000	3,000	150	150
4	Siltstone (M-H)	700	3,500	30,000	350	600
5	Sandstone (M-H)	900	6,000	60,000	600	1,500

Notes: (1) Shaft adhesion values only apply to piled foundations socketed into the respective material.
Values listed in Table 10 are subject to confirmation during construction.
Strength: VL = Very Low L = Low M = Medium H = High

<u>All footings</u> should be inspected by a geotechnical engineer to confirm that foundation conditions are in accordance with the design requirements.

Higher bearing capacities for footings are possible (e.g. 6,000 kPa allowable for Unit 4 M-H Siltstone and 8,000 kPa allowable for Unit 5 M-H Sandstone), but will require additional review and will necessitate spoon testing/proof coring during construction as required.

Footings designed on the basis of the allowable bearing pressures provided could expect settlements of up to 1% of the footing width.

Shallow footings founding near excavations (service trenches or similar) must have all loads transferred to below an influence line inclined upwards at 45 degrees commencing from the lowest and closest side of the excavation or trench base. Footings founding above this line should be subject to specific geotechnical inspection during construction.

7.6 Soil Aggressivity

In accordance with AS2159-2009: Piling-Design and Installation, the results of the soil aggressivity testing indicate that the tested materials are:

- Mildly aggressive to buried concrete; and,
- Non-aggressive to buried steel.

The mildly aggressive classification for buried concrete is based on a single pH reading less than 5.5. Where this is considered to have significant cost implications, further sampling and laboratory testing may be undertaken to adopt a non-aggressive classification (e.g. the pH of 5.1 may be considered an outlier with a larger data set).

7.7 Acid Sulphate Soil and Salinity

On the basis of desktop information (outlined in Section 3.4) and the borehole results, acid sulphate soil (ASS) at the site is not considered a risk and an ASS management plan will therefore not be required.

As outlined in Table 5 the laboratory testing indicated that the natural clay soils at the site are non-saline. The testing also indicated some zones of slightly saline fill. Management strategies are only required for salinity levels of moderately saline and higher, therefore meaning that a salinity management plan is not required for the site.

7.8 Seismic Design

In accordance with AS1170–2024 "Structural Design Actions, Part 4: Earthquake Actions in Australia", a hazard factor (Z) of 0.08 and a site subsoil Class B_e (Shallow Rock) is considered to be appropriate for the site.

Due to the surface layer of soil at the site being slightly greater than 3 m in localised areas, Clause 4.2.3 suggests a subsoil Class of C_e (Shallow Soil), which is in strict accordance with AS1170. This is considered to be too conservative as the assumed natural site period at the site can reasonably assumed to be less than 0.15 seconds.

7.9 Groundwater

Groundwater seepage was encountered in all wells. The source of this water is believed to be predominantly from rainfall infiltration seepage flowing down the soil/rock interface and through joints and bedding planes in the rock (i.e. unconfined, low productivity aquifer). Due to the perched nature of this water, it is thought to be a 'local' water table. During periods of heavy rainfall, shallow seepage flow along the interface between the soil and rock is expected.

Given the elevated topographical location of the site it is expected that the regional groundwater table will be well below the proposed bulk excavation level.

Groundwater level monitoring was undertaken from January 2025 to June 2025 and indicated a maximum groundwater level of around RL 86.1 in BH01.

Permeability testing results (Table 2) indicate hydraulic conductivity values that are similar to typical values commonly seen within similar rock formations in Sydney (Pells et. al., 2018, *Classification of Sandstones and Shales in the Sydney Region*).

It is expected that inflows would be relatively low, which could be estimated with groundwater numerical modelling (e.g. Seep-w) if required. The subsurface conditions encountered in the boreholes indicate that wet weather/perched seepage can probably be controlled using sub-floor drainage and collection system. Pumping will be needed to remove seepage from footing/pile excavations prior to the placement of concrete.

We expect that nearly all basements in the area would be drained and consider that a tanked basement is unnecessarily conservative for this site. Should approval for a drained basement not be possible a tanked or partially tanked basement may be required to prevent groundwater inflow during the operational period of the building.

From a regulatory viewpoint construction stage dewatering at this site would generally need to consider the following:

- A **Water Supply Works** approval will be required from Water NSW, which will require a Dewatering Management Plan. This Plan should cover the proposed measures for shortterm and long-term dewatering management and will need to include the results of the geotechnical investigation and an assessment of the predicted in-flow;

- The predicted or actual water 'take' is unlikely to be more than 3 ML/year so that a **Water Access Licence** should not be required, and the works would fall under a groundwater Water Access Licence exemption, but monitoring and reporting requirements to Water NSW would still generally apply. If the actual 'take' becomes greater than 3 ML/year, then the exemption will no longer apply, and a Water Access Licence will then be required; and
- Treatment of the captured groundwater will generally be required, unless the water can be proven to already meet the relevant water disposal criteria (e.g. stormwater or sewer criteria).

Access and maintenance of the permanent subfloor, subsoil and wall drainage systems should be considered in the design, and may include, for example, the flushing or removal of iron-rich 'sludge' from drainage systems, pipes and pumping systems, which can accumulate when iron-rich groundwater is exposed to the atmosphere.

Notwithstanding the above, it should be noted that groundwater levels can vary and may fluctuate overtime, particularly, following periods of heavy rainfall.

Refer to Douglas Groundwater Impact Assessment (ref: 233323.00.R.002.Rev0) for further information relating to groundwater inflow and construction stage dewatering.

7.10 Impacts on Nearby Infrastructure

The construction activities associated with the proposed development have the potential to impact nearby structures. It is anticipated that the following additional work may be required:

- Footing investigation for the existing two storey brick building at 6-8 McLaren Street (and potentially other nearby buildings), to determine the type and depth of footings;
- Numerical modelling to demonstrate that the proposed development will have negligible effect on Western Harbour Tunnel (WHT) understood to be approximately 40 m to 45 m below the site (further information should be sought from TfNSW); and,
- Specialist Engineering Assessment (SEA) for Sydney Water assets below the footpath on Pacific Highway (if requested).

8. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 253-265 Pacific Highway, North Sydney NSW in line with Douglas' proposal dated 10/12/2024 and acceptance received from Peter Navratil of Legacy Property Pty Ltd. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Legacy Property Pty Ltd 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.

The scope of work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of fill of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such fill may contain contaminants and hazardous building materials.

This report provides specialist advice only and no part of it is considered a Regulated Design under the Design and Building Practitioner Act 2020 (NSW).

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

October 2024

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.

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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Terminology, Symbols and Abbreviations

November 2023

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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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

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".

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 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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Rock Descriptions

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).

Rock Descriptions

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:

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

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

Rock Descriptions

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.

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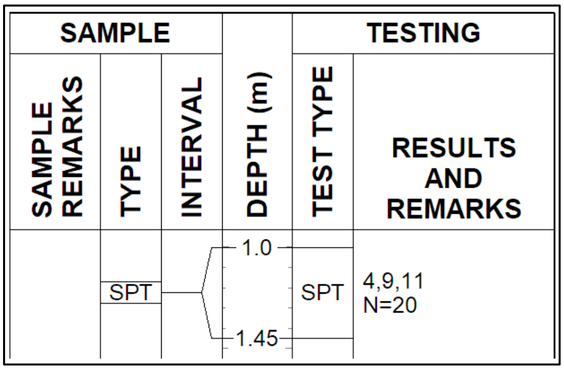
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

October 2024

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 B

Drawings

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Initial Issue	18.02.2025	MN

SCALE:
0 4 8 12 16 m
1:300 @ A3

Douglas PARTNERS

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

CLIENT:
Legacy Property Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 22.09.2024)
2: Base Survey Plan from Linker surveying , Reference 170713, Issue4 (Dated 12.02.2025)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Mixed Use Development

PROJECT ADRESS:
253-265 Pacific Highway, North Sydney

DRAWING TITLE:
Test Location Plan

PROJECT NO:
233323.00

DRAWING NO:
1

REVISION:
0

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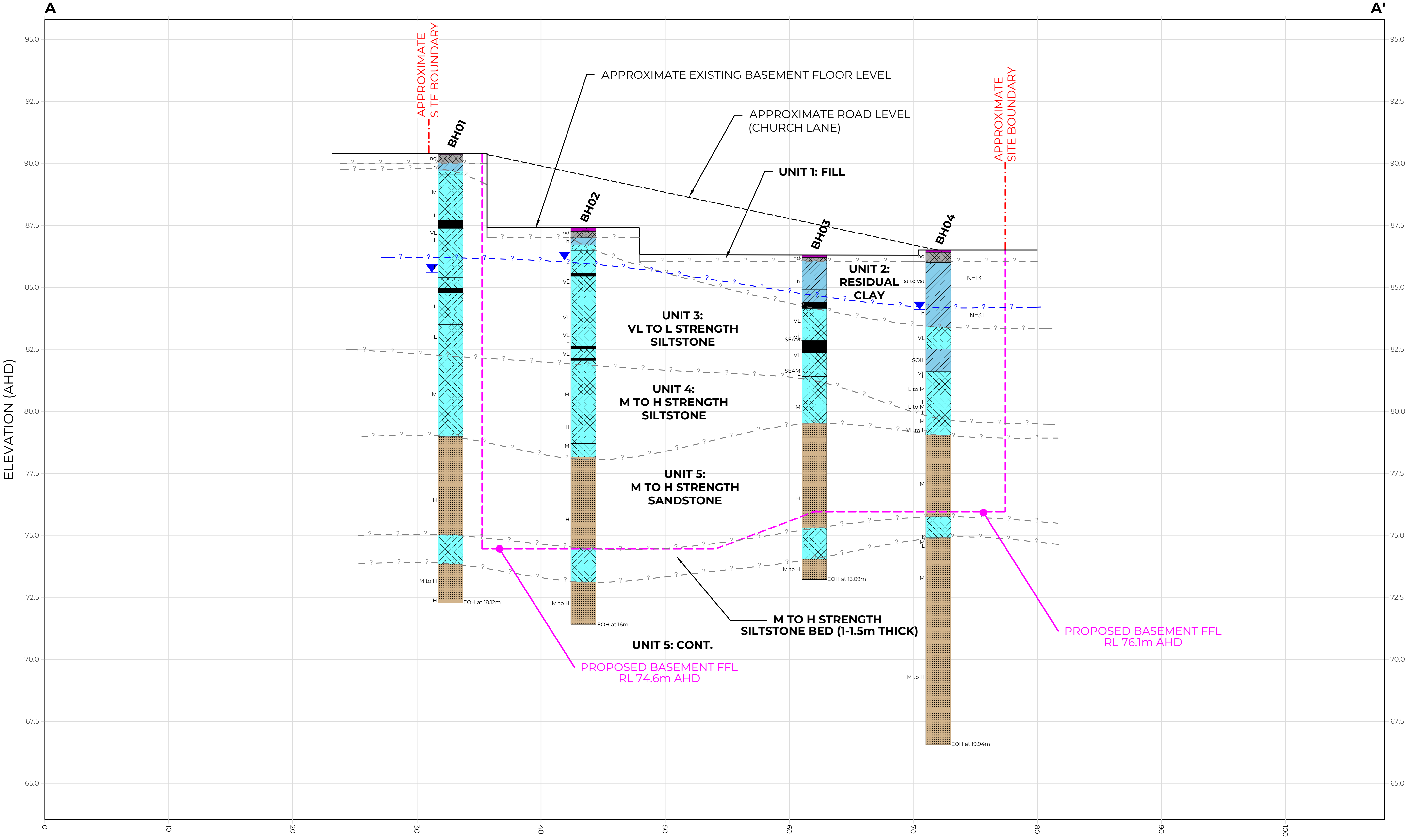


LEGEND

▨ Residual CLAY
▨ FILL
▨ CONCRETE
▨ SANDSTONE
■ NO CORE
▨ SILTSTONE

TESTS / OTHER

— ? — — - Interpreted geotechnical boundary
— ? — — - Interpreted Groundwater Level
N - Standard penetration test value
▼ - Water level (30.01.2025)

FFL - FINISHED FLOOR LEVEL

ROCK STRENGTH
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High

SOIL CONSISTENCY
vs - Very Soft
s - Soft
f - Firm
st - Stiff
vst - Very Stiff
h - Hard

\\dpsydnas02\Projects\233323.00 - NORTH SYDNEY, 253-265 Pacific Highway\7.0 Drawings\7.2 Out\233323.00.D.002.Rev0_Test Location Plan.dwg

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Initial Issue	20.06.2025	MN/EC

0 6
Horizontal Scale 1:300
Vertical Exaggeration = 2.0

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

CLIENT:
Legacy Property Pty Ltd

NOTES
1. Subsurface conditions are accurate at the borehole locations only.
Variations in subsurface conditions may occur between borehole locations.
Interpreted strata boundaries are approximate and should be used as a guide only.
2. Summary logs only and should be read in conjunction with detailed logs.
3. Horizontal and vertical scales are not equal.

PROJECT NAME:
Proposed Mixed Use Development

PROJECT ADDRESS:
253-265 Pacific Highway, North Sydney

DRAWING TITLE:
Geological Cross Section A-A'

PROJECT No:
233323.00

DRAWING No:
2

REVISION:
0

Appendix C

Field Work Results

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 90.4 AHD
COORDINATE: E:333916.8, N:6254816.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 233323.00
DATE: 23/01/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED

DEPTH (m)	DESCRIPTION OF STRATA	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE
0.05	CONCRETE: 50mm thick, no reo observed			ND
0.20	FILL / SAND, with gravel: brown.	FILL	ND	D
0.40	FILL / Gravelly SAND: dark grey; fine to medium; siltstone and sandstone gravel.	FILL		
0.70	CLAY (CI-CH): pale yellow-brown; medium to high plasticity.	RS	H	w<PL
0.85	SILTSTONE: pale yellow-brown; apparently very low strength. Ashfield Shale			
	Continued as rock			

From 0.60m: becoming extremely weathered siltstone with very low strength siltstone bands

GROUNDWATER: ▼ 30/01/25

SAMPLE

TYPE	INTERVAL DEPTH (m)
D	0.05 – 0.20
D	0.20 – 0.40
D	0.40 – 0.60
D	0.60 – 0.70

TESTING AND REMARKS

BACKFILL: Concrete; Sand

WELL PIPE

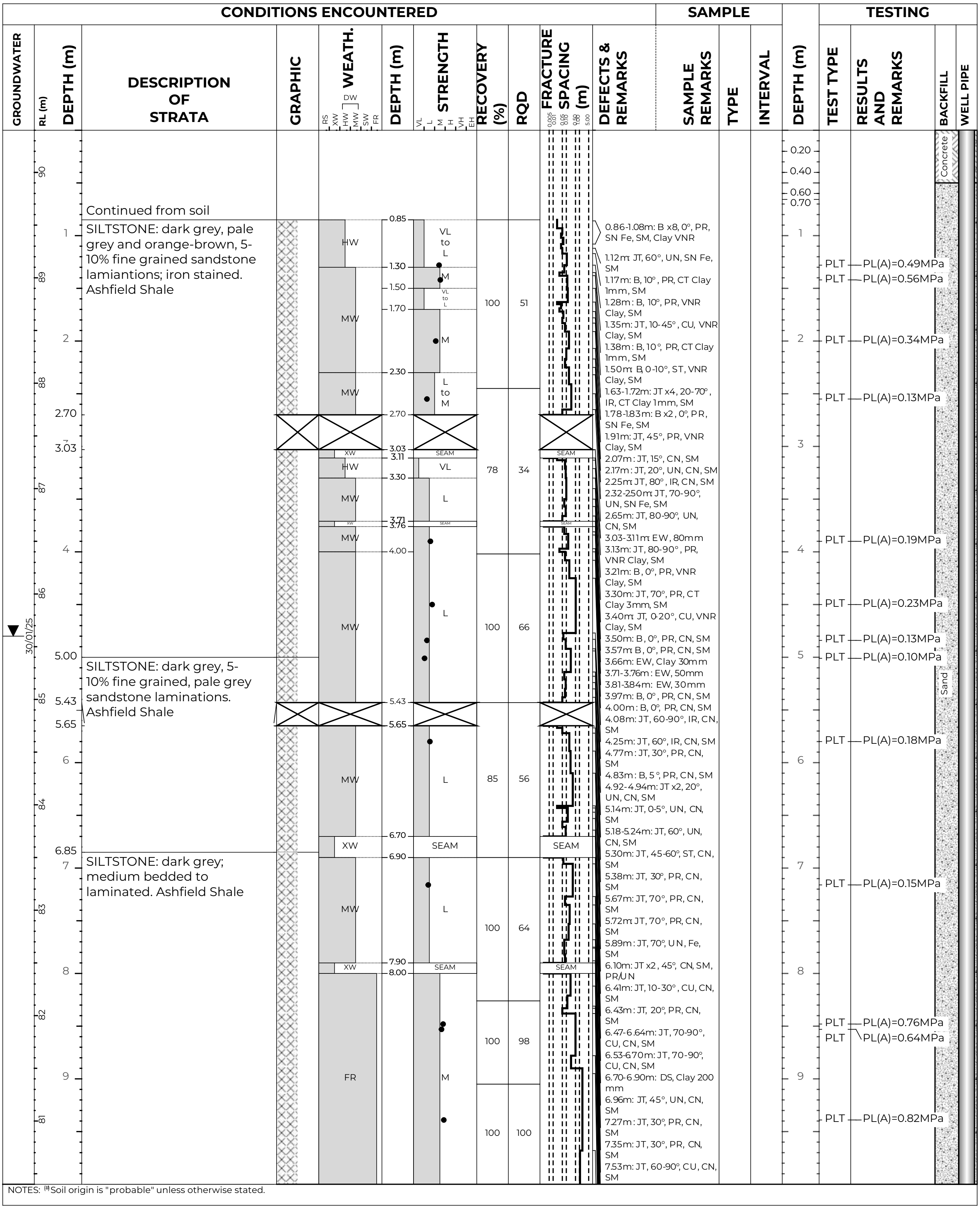
NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Proline
OPERATOR: Tightsite (Ben)
LOGGED: R.Muller & E.Miler
METHOD: DT to 0.05m, HA to 0.85m, NMLC to 18.12m
CASING: HQ to 0.75m
REMARKS: Borehole drilled within existing shed behind no. 265 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd		**SURFACE LEVEL:** 90.4 AHD	**LOCATION ID:** BH01
PROJECT: Proposed Mixed Use Development		**COORDINATE:** E:333916.8, N:6254816.5	**PROJECT No:** 233323.00
LOCATION: 253-265 Pacific Highway, North Sydney, NSW		**DATUM/GRID:** MGA2020 Zone 56	**DATE:** 23/01/25
		DIP/AZIMUTH: 90°/---°	**SHEET:** 2 of 3



Continued from soil

DEPTH (m)	DESCRIPTION OF STRATA
0.85	SILTSTONE: dark grey, pale grey and orange-brown, 5-10% fine grained sandstone lamiantions; iron stained. Ashfield Shale
5.00	SILTSTONE: dark grey, 5-10% fine grained, pale grey sandstone laminations. Ashfield Shale
6.85	SILTSTONE: dark grey; medium bedded to laminated. Ashfield Shale

DEPTH (m)	WEATH.	STRENGTH
0.85	HW	VL to L
1.30	MW	M
1.50		VL to L
1.70	MW	M
2.30	MW	L to M
2.70		
3.03	XW	SEAM
3.11	HW	VL
3.30	MW	L
3.71	XW	SEAM
3.76	MW	
4.00	MW	L
5.43		
5.65	MW	L
6.70	XW	SEAM
6.90	MW	L
7.90	XW	SEAM
8.00	FR	M

RECOVERY (%)	RQD
100	51
78	34
100	66
85	56
100	64
100	98
100	100

0.86-1.08m: B x8, 0°, PR, SN Fe, SM, Clay VNR
1.12m: JT, 60°, UN, SN Fe, SM
1.17m: B, 10°, PR, CT Clay 1mm, SM
1.28m: B, 10°, PR, VNR Clay, SM
1.35m: JT, 10-45°, CU, VNR Clay, SM
1.38m: B, 10°, PR, CT Clay 1mm, SM
1.50m: B, 0-10°, ST, VNR Clay, SM
1.63-1.72m: JT x4, 20-70°, IR, CT Clay 1mm, SM
1.78-1.83m: B x2, 0°, PR, SN Fe, SM
1.91m: JT, 45°, PR, VNR Clay, SM
2.07m: JT, 15°, CN, SM
2.17m: JT, 20°, UN, CN, SM
2.25m: JT, 80°, IR, CN, SM
2.32-250m: JT, 70-90°, UN, SN Fe, SM
2.65m: JT, 80-90°, UN, CN, SM
3.03-3.11m: EW, 80mm
3.13m: JT, 80-90°, PR, VNR Clay, SM
3.21m: B, 0°, PR, VNR Clay, SM
3.30m: JT, 70°, PR, CT Clay 3mm, SM
3.40m: JT, 0-20°, CU, VNR Clay, SM
3.50m: B, 0°, PR, CN, SM
3.57m: B, 0°, PR, CN, SM
3.66m: EW, Clay 30mm
3.71-3.76m: EW, 50mm
3.81-3.84m: EW, 30mm
3.97m: B, 0°, PR, CN, SM
4.00m: B, 0°, PR, CN, SM
4.08m: JT, 60-90°, IR, CN, SM
4.25m: JT, 60°, IR, CN, SM
4.77m: JT, 30°, PR, CN, SM
4.83m: B, 5°, PR, CN, SM
4.92-4.94m: JT x2, 20°, UN, CN, SM
5.14m: JT, 0-5°, UN, CN, SM
5.18-5.24m: JT, 60°, UN, CN, SM
5.30m: JT, 45-60°, ST, CN, SM
5.38m: JT, 30°, PR, CN, SM
5.67m: JT, 70°, PR, CN, SM
5.72m: JT, 70°, PR, CN, SM
5.89m: JT, 70°, UN, Fe, SM
6.10m: JT x2, 45°, CN, SM, PR/UN
6.41m: JT, 10-30°, CU, CN, SM
6.43m: JT, 20°, PR, CN, SM
6.47-6.64m: JT, 70-90°, CU, CN, SM
6.53-6.70m: JT, 70-90°, CU, CN, SM
6.70-6.90m: DS, Clay 200 mm
6.96m: JT, 45°, UN, CN, SM
7.27m: JT, 30°, PR, CN, SM
7.35m: JT, 30°, PR, CN, SM
7.53m: JT, 60-90°, CU, CN, SM

TEST TYPE	RESULTS AND REMARKS
PLT	PL(A)=0.49MPa
PLT	PL(A)=0.56MPa
PLT	PL(A)=0.34MPa
PLT	PL(A)=0.13MPa
PLT	PL(A)=0.19MPa
PLT	PL(A)=0.23MPa
PLT	PL(A)=0.13MPa
PLT	PL(A)=0.10MPa
PLT	PL(A)=0.18MPa
PLT	PL(A)=0.15MPa
PLT	PL(A)=0.76MPa
PLT	PL(A)=0.64MPa
PLT	PL(A)=0.82MPa

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

Generated with CORE-GS by Geroc - Split Soil-Rock Log

PLANT: Proline **OPERATOR:** Tightsite (Ben) **LOGGED:** R.Muller & E.Miler

METHOD: DT to 0.05m, HA to 0.85m, NMLC to 18.12m **CASING:** HQ to 0.75m

REMARKS: Borehole drilled within existing shed behind no. 265 Pacific Highway.
Coordinates estimated using tape measurements from site features.
Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

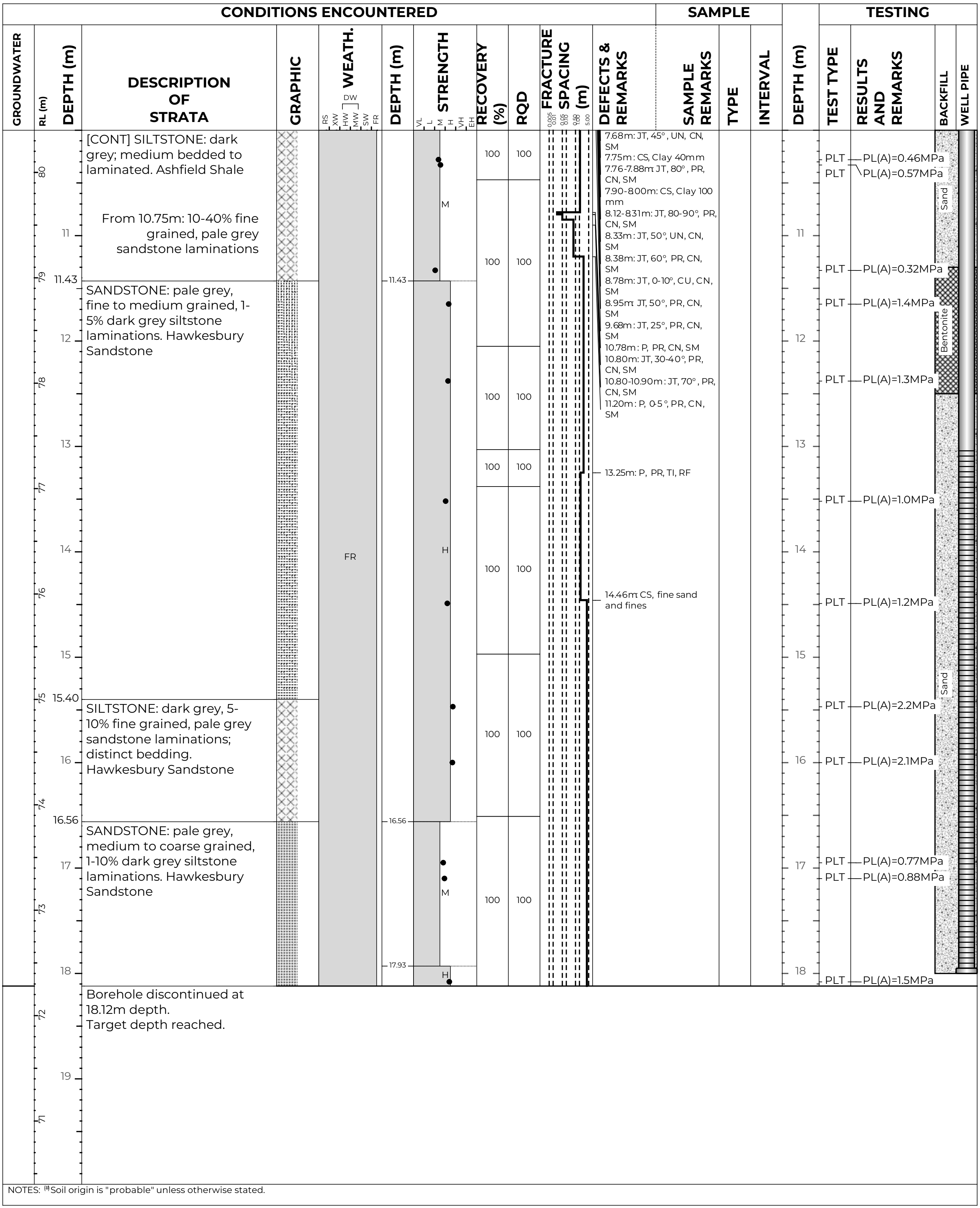
Douglas
PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 90.4 AHD
COORDINATE: E:333916.8, N:6254816.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 233323.00
DATE: 23/01/25
SHEET: 3 of 3



DEPTH (m)	RL (m)	DESCRIPTION OF STRATA	WEATH.	STRENGTH
to 11.43		[CONT] SILTSTONE: dark grey; medium bedded to laminated. Ashfield Shale From 10.75m: 10-40% fine grained, pale grey sandstone laminations	FR	M
11.43	79	SANDSTONE: pale grey, fine to medium grained, 1-5% dark grey siltstone laminations. Hawkesbury Sandstone	FR	H
15.40	75	SILTSTONE: dark grey, 5-10% fine grained, pale grey sandstone laminations; distinct bedding. Hawkesbury Sandstone	FR	H
16.56		SANDSTONE: pale grey, medium to coarse grained, 1-10% dark grey siltstone laminations. Hawkesbury Sandstone	FR	M
17.93				H
18.12		Borehole discontinued at 18.12m depth. Target depth reached.		

RECOVERY (%)	RQD
100	100
100	100
100	100
100	100
100	100
100	100
100	100

DEFECTS & REMARKS

7.68m: JT, 45°, UN, CN, SM
7.75m: CS, Clay 40mm
7.76-7.88m: JT, 80°, PR, CN, SM
7.90-8.00m: CS, Clay 100 mm
8.12-8.31m: JT, 80-90°, PR, CN, SM
8.33m: JT, 50°, UN, CN, SM
8.38m: JT, 60°, PR, CN, SM
8.78m: JT, 0-10°, CU, CN, SM
8.95m: JT, 50°, PR, CN, SM
9.68m: JT, 25°, PR, CN, SM
10.78m: P, PR, CN, SM
10.80m: JT, 30-40°, PR, CN, SM
10.80-10.90m: JT, 70°, PR, CN, SM
11.20m: P, 0-5°, PR, CN, SM
13.25m: P, PR, TI, RF
14.46m: CS, fine sand and fines

TEST TYPE	RESULTS AND REMARKS
PLT	PL(A)=0.46MPa
PLT	PL(A)=0.57MPa
PLT	PL(A)=0.32MPa
PLT	PL(A)=1.4MPa
PLT	PL(A)=1.3MPa
PLT	PL(A)=1.0MPa
PLT	PL(A)=1.2MPa
PLT	PL(A)=2.2MPa
PLT	PL(A)=2.1MPa
PLT	PL(A)=0.77MPa
PLT	PL(A)=0.88MPa
PLT	PL(A)=1.5MPa

NOTES: [a]Soil origin is "probable" unless otherwise stated.

PLANT: Proline
OPERATOR: Tightsite (Ben)
LOGGED: R.Muller & E.Miler
METHOD: DT to 0.05m, HA to 0.85m, NMLC to 18.12m
CASING: HQ to 0.75m
REMARKS: Borehole drilled within existing shed behind no. 265 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT:	Legacy Property Pty Ltd	**SURFACE LEVEL:**	90.4 AHD	**LOCATION ID:**	BH01
PROJECT:	Proposed Mixed Use Development	**COORDINATE:**	E:333916.8, N:6254816.5	**PROJECT No:**	233323.00
LOCATION:	253-265 Pacific Highway, North Sydney, NSW	**DATUM/GRID:**	MGA2020 Zone 56	**DATE:**	23/01/25
		DIP/AZIMUTH:	90°/---°	**SHEET:**	1 of 2

0.85-5.00 m depth

5.00-10.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 90.4 AHD
COORDINATE: E:333916.8, N:6254816.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 233323.00
DATE: 23/01/25
SHEET: 2 of 2

10.00-15.00 m depth

15.00-18.12 m depth

Generated with CORE-GS by Geroc - Split Soil-Rock Log

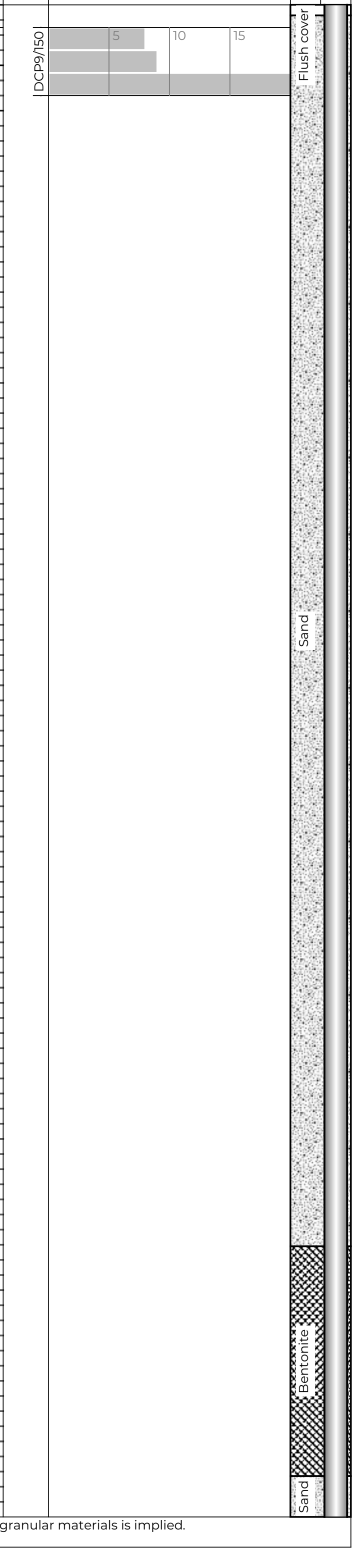
BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.4 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED							SAMPLE			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	ORIGIN(#)	CONSIS.(*) ▨ DENSITY.(*) ▨	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)
		0.15	CONCRETE: 150mm thick; SL62 at 70mm depth			ND				0.15
	87	0.40	FILL / Sandy GRAVEL: grey; fine to coarse, igneous; trace fines.	FILL	ND	W		D		0.40
		0.70	CLAY (CI-CH), with gravel: grey; medium to high plasticity; silstone gravel.	RS	H	w=PL		D		0.70
		0.93	SILTSTONE: grey; apparently very low strength							
▼ 30/01/25	86		Continued as rock							
	85	2	0.60m: increased drill resistance; becoming extremely weathered siltstone with highly weathered; very low strength siltstone							2



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
OPERATOR: Tightsite
LOGGED: R.Muller
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m
CASING: HQ to 0.94m
REMARKS: Borehole drilled within existing basement of no. 263 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

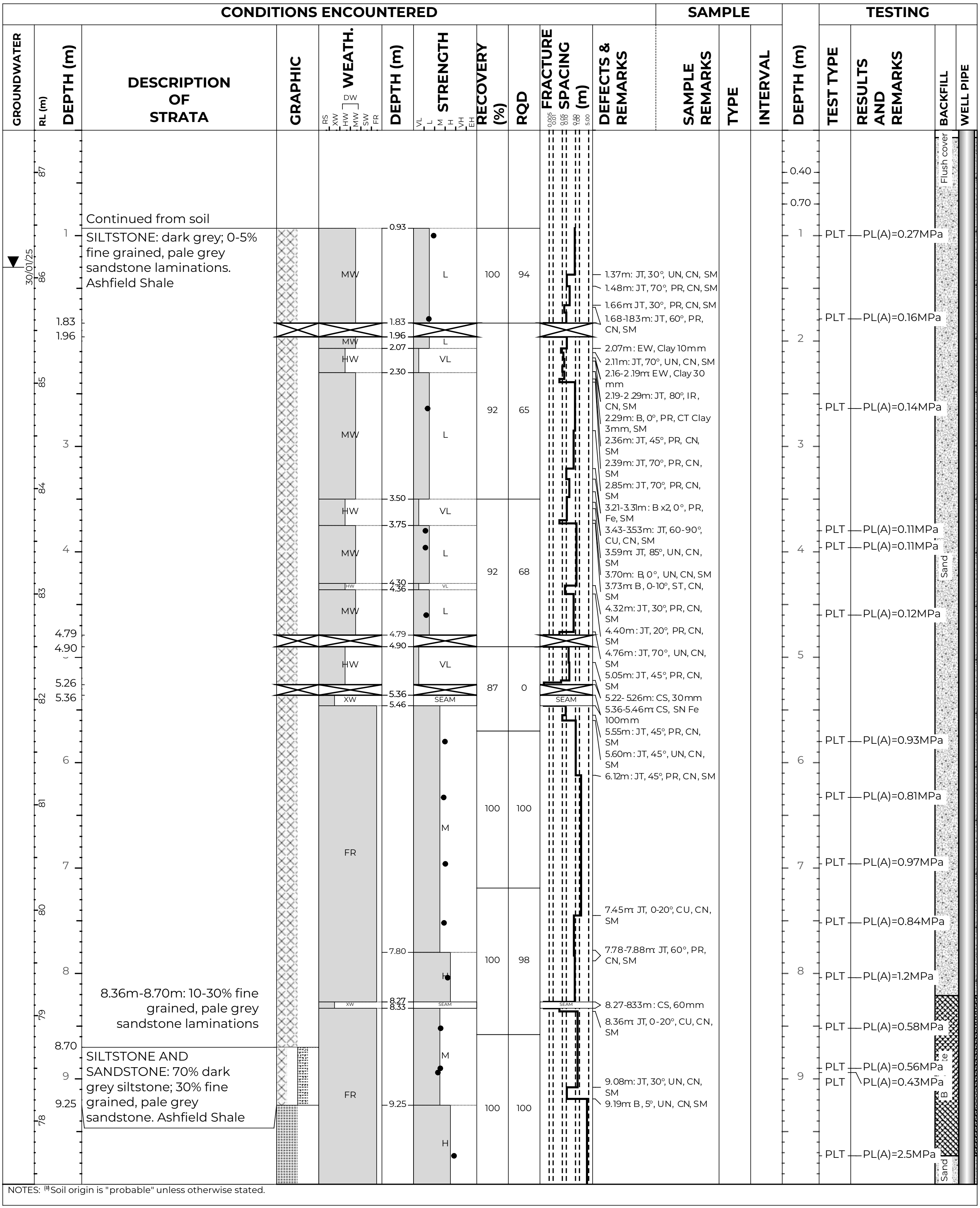
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.4 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 2 of 3



DEPTH (m)	DESCRIPTION OF STRATA
	Continued from soil
	SILTSTONE: dark grey; 0-5% fine grained, pale grey sandstone laminations. Ashfield Shale
1.83	
1.96	
4.79	
4.90	
5.26	
5.36	
	8.36m-8.70m: 10-30% fine grained, pale grey sandstone laminations
8.70	SILTSTONE AND SANDSTONE: 70% dark grey siltstone; 30% fine grained, pale grey sandstone. Ashfield Shale
9.25	

DEPTH (m)	WEATH.	STRENGTH
0.93	MW	L
1.83		
1.96	MW	L
2.07	HW	VL
2.30	MW	L
3.50	HW	VL
3.75	MW	L
4.30	HW	VL
4.36	MW	L
4.79		
4.90	HW	VL
5.36	XW	SEAM
5.46	FR	M
7.80		H
8.27	XW	SEAM
8.33	FR	M
9.25		H

RECOVERY (%)	RQD
100	94
92	65
92	68
87	0
100	100
100	98
100	100

DEFECTS & REMARKS

1.37m: JT, 30°, UN, CN, SM
1.48m: JT, 70°, PR, CN, SM
1.66m: JT, 30°, PR, CN, SM
1.68-1.83m: JT, 60°, PR, CN, SM
2.07m: EW, Clay 10mm
2.11m: JT, 70°, UN, CN, SM
2.16-2.19m: EW, Clay 30 mm
2.19-2.29m: JT, 80°, IR, CN, SM
2.29m: B, 0°, PR, CT Clay 3mm, SM
2.36m: JT, 45°, PR, CN, SM
2.39m: JT, 70°, PR, CN, SM
2.85m: JT, 70°, PR, CN, SM
3.21-3.31m: B x2, 0°, PR, Fe, SM
3.43-3.53m: JT, 60-90°, CU, CN, SM
3.59m: JT, 85°, UN, CN, SM
3.70m: B, 0°, UN, CN, SM
3.73m: B, 0-10°, ST, CN, SM
4.32m: JT, 30°, PR, CN, SM
4.40m: JT, 20°, PR, CN, SM
4.76m: JT, 70°, UN, CN, SM
5.05m: JT, 45°, PR, CN, SM
5.22-5.26m: CS, 30mm
5.36-5.46m: CS, SN Fe 100mm
5.55m: JT, 45°, PR, CN, SM
5.60m: JT, 45°, UN, CN, SM
6.12m: JT, 45°, PR, CN, SM
7.45m: JT, 0-20°, CU, CN, SM
7.78-7.88m: JT, 60°, PR, CN, SM
8.27-8.33m: CS, 60mm
8.36m: JT, 0-20°, CU, CN, SM
9.08m: JT, 30°, UN, CN, SM
9.19m: B, 5°, UN, CN, SM

TEST TYPE	RESULTS AND REMARKS
PLT	PL(A)=0.27MPa
PLT	PL(A)=0.16MPa
PLT	PL(A)=0.14MPa
PLT	PL(A)=0.11MPa
PLT	PL(A)=0.11MPa
PLT	PL(A)=0.12MPa
PLT	PL(A)=0.93MPa
PLT	PL(A)=0.81MPa
PLT	PL(A)=0.97MPa
PLT	PL(A)=0.84MPa
PLT	PL(A)=1.2MPa
PLT	PL(A)=0.58MPa
PLT	PL(A)=0.56MPa
PLT	PL(A)=0.43MPa
PLT	PL(A)=2.5MPa

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

Generated with CORE-GS by Geroc - Split Soil-Rock Log

PLANT: Proline
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 0.94m

REMARKS: Borehole drilled within existing basement of no. 263 Pacific Highway.
Coordinates estimated using tape measurements from site features.
Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

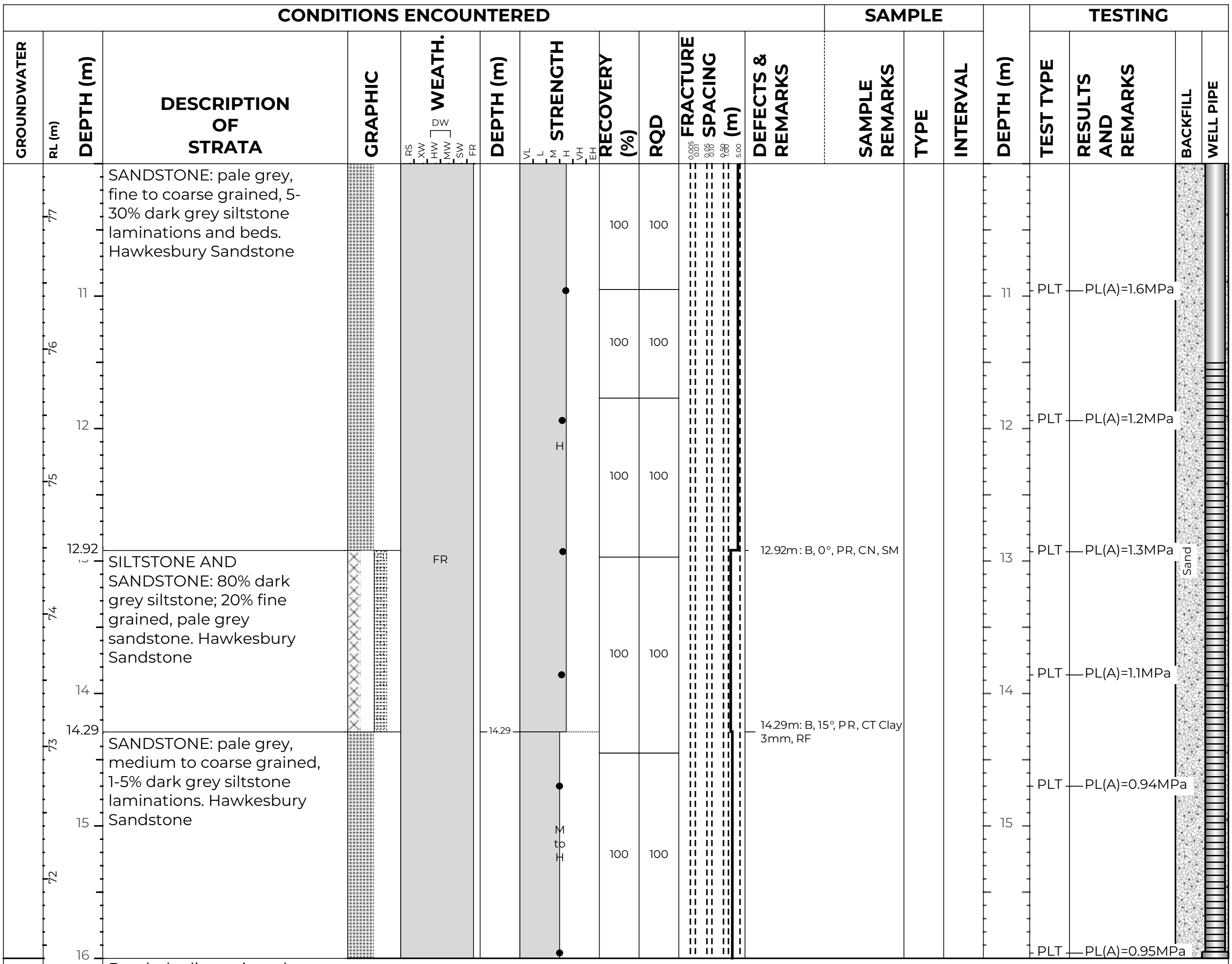
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.4 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 3 of 3



RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	WEATH.	DEPTH (m)	STRENGTH	DEFECTS & REMARKS
		SANDSTONE: pale grey, fine to coarse grained, 5-30% dark grey siltstone laminations and beds. Hawkesbury Sandstone	FR		H	
	12.92	SILTSTONE AND SANDSTONE: 80% dark grey siltstone; 20% fine grained, pale grey sandstone. Hawkesbury Sandstone	FR			12.92m : B, 0°, PR, CN, SM
	14.29	SANDSTONE: pale grey, medium to coarse grained, 1-5% dark grey siltstone laminations. Hawkesbury Sandstone	FR	14.29	M to H	14.29m: B, 15°, PR, CT Clay 3mm, RF
	16	Borehole discontinued at 16.00m depth. Target depth reached.				

RECOVERY (%)	RQD
100	100
100	100
100	100
100	100
100	100

TEST TYPE	RESULTS AND REMARKS
PLT	PL(A)=1.6MPa
PLT	PL(A)=1.2MPa
PLT	PL(A)=1.3MPa
PLT	PL(A)=1.1MPa
PLT	PL(A)=0.94MPa
PLT	PL(A)=0.95MPa

BACKFILL: Sand

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

PLANT: Proline
METHOD: DT to 0.15m, HA to 0.93m, NMLC to 16.0m
REMARKS: Borehole drilled within existing basement of no. 263 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

OPERATOR: Tightsite

LOGGED: R.Muller
CASING: HQ to 0.94m

Refer to explanatory notes for symbol and abbreviation definitions

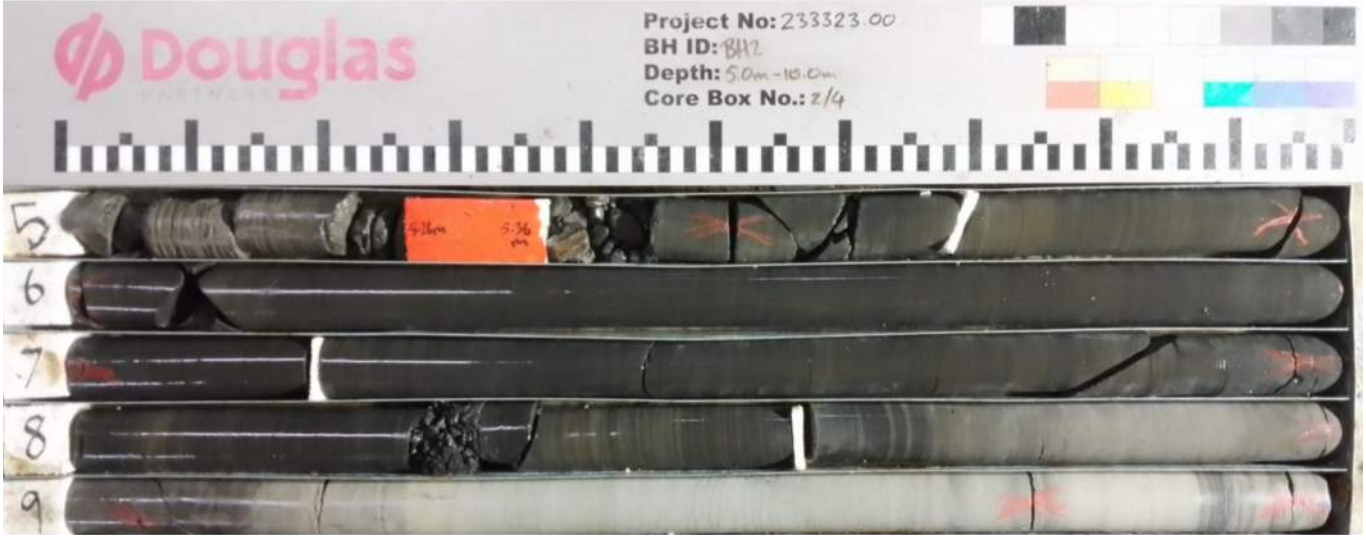
CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.4 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 1 of 2

0.93-5.00 m depth



5.00-10.00 m depth

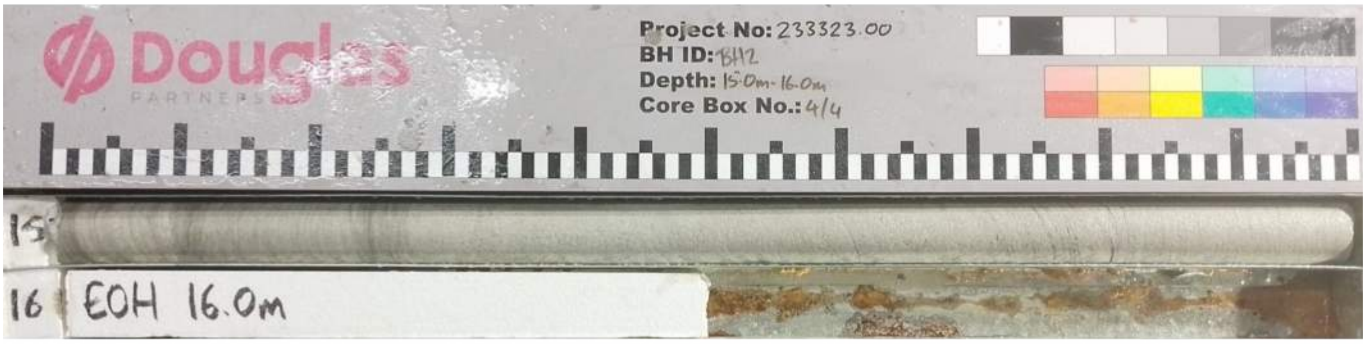
CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 87.4 AHD
COORDINATE: E:333902.1, N:6254802.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 233323.00
DATE: 21/01/25
SHEET: 2 of 2

10.00-15.00 m depth



15.00-16.00 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.3 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED

GROUNDWATER: 20/01/25 No free groundwater observed whilst augering

DEPTH (m)	DESCRIPTION OF STRATA	ORIGIN(#)	CONSIS.(*) ▇ DENSITY.(*) ▨	MOISTURE
0.10	CONCRETE: 100mm thick, no reo observed		ND	ND
0.25	FILL / Gravelly CLAY, with sand: grey; medium to high plasticity; medium to coarse, igneous gravel.	FILL		w>PL
	CLAY (CI-CH): grey; medium to high plasticity.	RS	H	w<PL
1.40	CLAY: grey; medium plasticity; with pockets of highly weathered siltstone.	XWM		
1.90	Continued as rock			

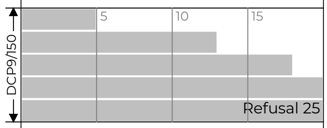
SAMPLE

TYPE	INTERVAL DEPTH (m)
D	0.10 – 0.25
D	0.80 – 0.90
D	1.40 – 1.50
D	1.80 – 1.90

TESTING AND REMARKS

TEST TYPE: DCP9/150

RESULTS AND REMARKS:



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
OPERATOR: Tightsite
LOGGED: R.Muller
METHOD: DT to 0.1m, HA to 1.9m, NMLC to 13.09m
CASING: HQ to 1.9m

REMARKS: Borehole drilled within existing basement of no. 255-259 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

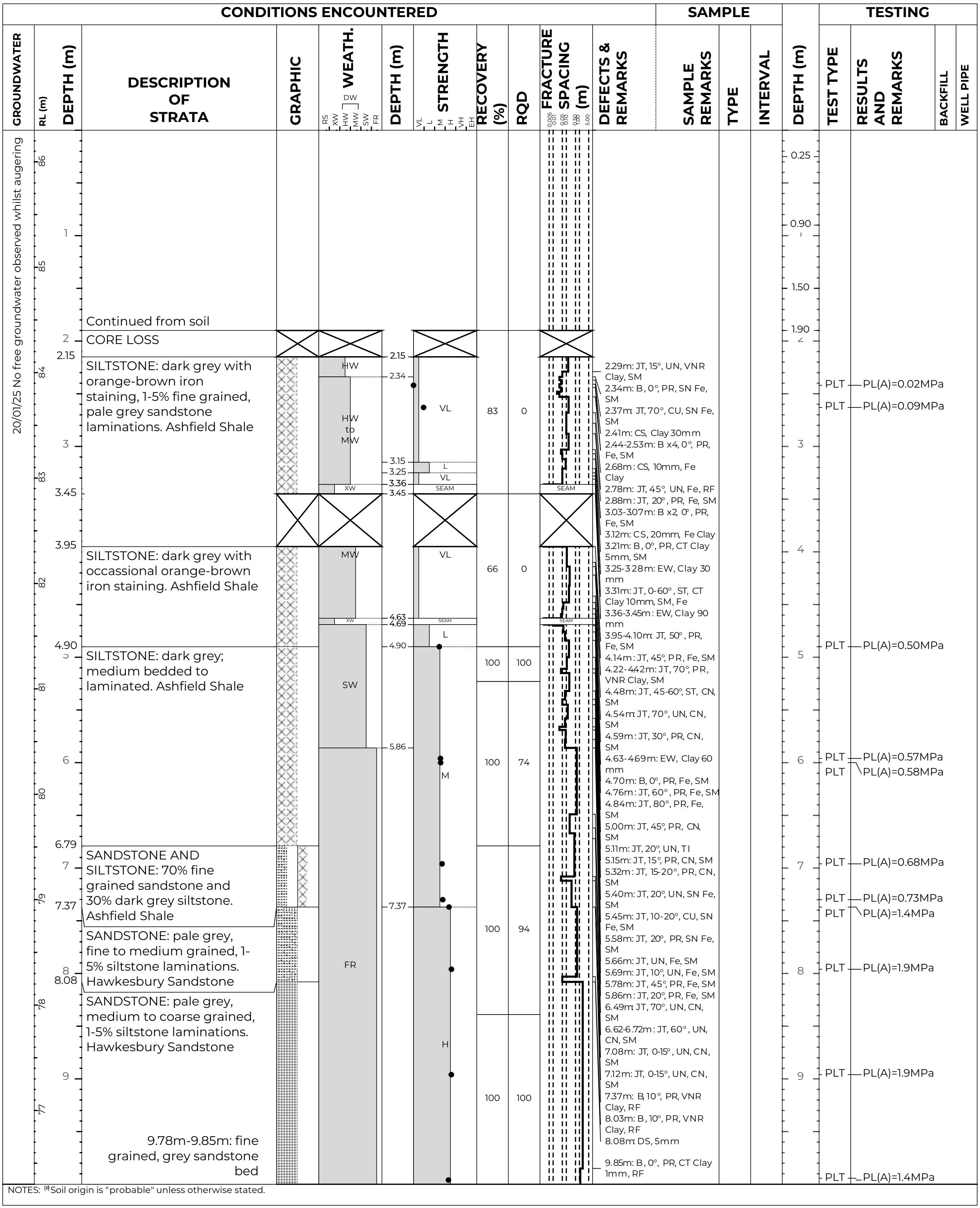
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.3 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 2 of 3



DEPTH (m)	DESCRIPTION OF STRATA	WEATH.	STRENGTH	RECOVERY (%)	RQD
	Continued from soil				
2	CORE LOSS				
2.15	SILTSTONE: dark grey with orange-brown iron staining, 1-5% fine grained, pale grey sandstone laminations. Ashfield Shale	HW (2.15–2.34) HW to MW (2.34–3.36) XW (3.36–3.45)	VL (2.15–3.15) L (3.15–3.25) VL (3.25–3.36) SEAM (3.36–3.45)	83	0
3.45					
3.95	SILTSTONE: dark grey with occassional orange-brown iron staining. Ashfield Shale	MW (3.95–4.63) xw (4.63–4.69)	VL (3.95–4.63) SEAM (4.63–4.69) L (4.69–4.90)	66	0
4.90	SILTSTONE: dark grey; medium bedded to laminated. Ashfield Shale	SW (to 5.86) FR (5.86–)	M	100 100	100 74
6.79	SANDSTONE AND SILTSTONE: 70% fine grained sandstone and 30% dark grey siltstone. Ashfield Shale	FR	M		
7.37	SANDSTONE: pale grey, fine to medium grained, 1-5% siltstone laminations. Hawkesbury Sandstone	FR	H	100	94
8.08	SANDSTONE: pale grey, medium to coarse grained, 1-5% siltstone laminations. Hawkesbury Sandstone 9.78m-9.85m: fine grained, grey sandstone bed	FR	H	100	100

DEFECTS & REMARKS

2.29m: JT, 15°, UN, VNR Clay, SM
2.34m: B, 0°, PR, SN Fe, SM
2.37m: JT, 70°, CU, SN Fe, SM
2.41m: CS, Clay 30mm
2.44-2.53m: B x4, 0°, PR, Fe, SM
2.68m: CS, 10mm, Fe Clay
2.78m: JT, 45°, UN, Fe, RF
2.88m: JT, 20°, PR, Fe, SM
3.03-3.07m: B x2, 0°, PR, Fe, SM
3.12m: CS, 20mm, Fe Clay
3.21m: B, 0°, PR, CT Clay 5mm, SM
3.25-3.28m: EW, Clay 30 mm
3.31m: JT, 0-60°, ST, CT Clay 10mm, SM, Fe
3.36-3.45m: EW, Clay 90 mm
3.95-4.10m: JT, 50°, PR, Fe, SM
4.14m: JT, 45°, PR, Fe, SM
4.22-4.42m: JT, 70°, PR, VNR Clay, SM
4.48m: JT, 45-60°, ST, CN, SM
4.54m: JT, 70°, UN, CN, SM
4.59m: JT, 30°, PR, CN, SM
4.63-4.69m: EW, Clay 60 mm
4.70m: B, 0°, PR, Fe, SM
4.76m: JT, 60°, PR, Fe, SM
4.84m: JT, 80°, PR, Fe, SM
5.00m: JT, 45°, PR, CN, SM
5.11m: JT, 20°, UN, TI
5.15m: JT, 15°, PR, CN, SM
5.32m: JT, 15-20°, PR, CN, SM
5.40m: JT, 20°, UN, SN Fe, SM
5.45m: JT, 10-20°, CU, SN Fe, SM
5.58m: JT, 20°, PR, SN Fe, SM
5.66m: JT, UN, Fe, SM
5.69m: JT, 10°, UN, Fe, SM
5.78m: JT, 45°, PR, Fe, SM
5.86m: JT, 20°, PR, Fe, SM
6.49m: JT, 70°, UN, CN, SM
6.62-6.72m: JT, 60°, UN, CN, SM
7.08m: JT, 0-15°, UN, CN, SM
7.12m: JT, 0-15°, UN, CN, SM
7.37m: B, 10°, PR, VNR Clay, RF
8.03m: B, 10°, PR, VNR Clay, RF
8.08m: DS, 5mm
9.85m: B, 0°, PR, CT Clay 1mm, RF

TESTING

TEST TYPE	RESULTS AND REMARKS
PLT	PL(A)=0.02MPa
PLT	PL(A)=0.09MPa
PLT	PL(A)=0.50MPa
PLT	PL(A)=0.57MPa
PLT	PL(A)=0.58MPa
PLT	PL(A)=0.68MPa
PLT	PL(A)=0.73MPa
PLT	PL(A)=1.4MPa
PLT	PL(A)=1.9MPa
PLT	PL(A)=1.9MPa
PLT	PL(A)=1.4MPa

NOTES: [a]Soil origin is "probable" unless otherwise stated.

PLANT: Proline
OPERATOR: Tightsite
LOGGED: R.Muller
METHOD: DT to 0.1m, HA to 1.9m, NMLC to 13.09m
CASING: HQ to 1.9m

REMARKS: Borehole drilled within existing basement of no. 255-259 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.3 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED												SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. RS XW HW MW SW FR (DW)	DEPTH (m)	STRENGTH VL L M H VH EH	RECOVERY (%)	RQD	FRACTURE SPACING (m) 0.005 0.01 0.05 0.10 0.50 1.00 5.00	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	76		[CONT] SANDSTONE: pale grey, medium to coarse grained, 1-5% siltstone laminations. Hawkesbury Sandstone		FR		H	100	100										
	75	11.00	SANDSTONE AND SILTSTONE: 80% dark grey siltstone and 20% fine grained pale grey sandstone. Hawkesbury Sandstone								11.00m: B, 0°, PR, CN, SM 11.73m: B, 0°, PR, CN, SM				11 12	PLT PLT PLT	PL(A)=2.1MPa PL(A)=2.0MPa PL(A)=2.6MPa		
	74	12.25	SANDSTONE: pale grey, fine to medium grained, 1-5% siltstone laminations. Hawkesbury Sandstone			12.25	M to H	100	100		12.25m: B, 0°, PR, CN, RF				13	PLT PLT	PL(A)=0.90MPa PL()=1.2MPa		

Borehole discontinued at 13.09m depth.
Target depth reached.

RL (m)	DEPTH (m)
73	13
72	14
71	15
70	16
69	17
68	18
67	19

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

PLANT: Proline
OPERATOR: Tightsite
LOGGED: R.Muller
METHOD: DT to 0.1m, HA to 1.9m, NMLC to 13.09m
CASING: HQ to 1.9m
REMARKS: Borehole drilled within existing basement of no. 255-259 Pacific Highway. Coordinates estimated using tape measurements from site features. Elevation estimated from client supplied survey plan (rev 4, issued 12/02/25).

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.3 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 1 of 2

1.90-6.00 m depth

6.00-11.00 m depth

Generated with CORE-GS by Geroc - Split Soil-Rock Log

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.3 AHD
COORDINATE: E:333910.7, N:6254785.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 233323.00
DATE: 20/01/25
SHEET: 2 of 2

11.00-13.09 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.5 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 1 of 3

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
		0.10	CONCRETE: 100mm thick; no reo observed						D		0.10 0.20			Flush cover	
	86	0.50	FILL / Gravelly CLAY: grey ; medium plasticity; with brick fragments.		FILL	ND	ND		D		0.40 0.50				
	85		CLAY (CI-CH): pale grey; medium to high plasticity. From 2.00m: grey and dark brown, increased drilling resistance		RS	St to VSt	w<PL		SPT		1.00 1.45	SPT PP	3,6,7 N=13 400-500kPa	Bentonite	
▼ 30/01/25	84	2.50	CLAY (CL-CI): pale grey; low to medium plasticity; friable, extremely weathered material.		XWM	H			SPT		2.50 2.95	SPT PP	6,13,18 N=31 friable >600kPa		
		3.10	Continued as rock											Bentonite Sand Bentonite Sand	

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: Bobcat
METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m
REMARKS: Coordinates and elevation obtained via use of DGPS.

OPERATOR: Ground Test (GM)

LOGGED: J. Valencic
CASING: HQ to 3.1m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.5 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED

GROUNDWATER: ▼ 30/01/25 (approx. 2.4 m)

RL (m): 86, 85, 84, 83, 82, 81, 80, 79, 78, 77

DEPTH (m)	DESCRIPTION OF STRATA	WEATH.	STRENGTH
	Continued from soil		
3.10	SILTSTONE: grey with red-brown staining, with hard clay seams (<25%); fragmented. Ashfield Shale	XW to HW	VL
4.00	CLAY (CI): grey and red-brown; medium plasticity; with bands of very low strength siltstone and sandstone (<25%); extremely weathered siltstone.	XW	SOIL
4.90	SILTSTONE: dark grey; fractured; bedded at 0°l with infrequent sandstone laminations (<5%). Ashfield Shale	HW	VL
7.45	SANDSTONE: pale grey, fine to medium grained, medium bedded. Hawkesbury Sandstone	SW	M

DEPTH (m)	WEATH.	STRENGTH
3.10	XW to HW	VL
4.00	XW	SOIL
4.90	HW	VL
5.05	HW	L
5.15 / 5.20	SW	L to M
6.07	SW	L
6.20	SW	L to M
6.45	SW	L
6.65	SW	M
7.14	SW	VL to L
7.38	SW	M

RECOVERY (%)	RQD	FRACTURE SPACING (m)
100	-	
100	15	SOIL
100	35	
100	55	
100	100	

DEFECTS & REMARKS

- 3.10-3.95m: , numerous B & JT, Fe
- 5.02m: B x7, 0-10°, SN Fe
- 5.53m: B x11, SN Fe
- 5.65m: JT, 75°, PR, CN
- 5.92m: JT, 25°, PR, CN
- 6.15m: JT, 75°, ST, SN Fe, SM
- 6.08-6.35m: B x4, 0-10°
- 6.49m: CS, 90mm
- 6.65-6.86m: B x3, 0°, CT Clay
- 7.20m: DS, 110mm
- 7.30-7.33m: B x2, 0°, CN, SM
- 7.50m: DS, Clay 8mm
- 7.54m: DS, Clay 20mm
- 8.02-8.14m: B x3, 0°, CN
- 8.20m: DS, Clay 20mm
- 8.44m: B, 5°, ST, CN, RF
- 9.63m: B, 0°, PR, CT Clay, RF

SAMPLE

SAMPLE REMARKS	TYPE	INTERVAL

TESTING

DEPTH (m): 0.20, 0.50, 1, 1.45, 2, 2.95, 4, 5, 6, 7, 8, 9

TEST TYPE	RESULTS AND REMARKS
PP	500kPa
PP	550kPa
PLT	PL(A)=0.29MPa
PLT	PL(A)=0.42MPa
PLT	PL(A)=0.25MPa
PLT	PL(A)=0.64MPa
PLT	PL(A)=0.75MPa
PLT	PL(A)=0.47MPa
PLT	PL(A)=1.6MPa
PLT	PL(A)=0.68MPa
PLT	PL(A)=0.79MPa

BACKFILL: Flush cover, Bentonite, Sand, Bentonite, Sand

WELL PIPE

NOTES: [a]Soil origin is "probable" unless otherwise stated.

PLANT: Bobcat
METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m
REMARKS: Coordinates and elevation obtained via use of DGPS.

OPERATOR: Ground Test (GM)

LOGGED: J. Valencic
CASING: HQ to 3.1m

Generated with CORE-GS by Geroc - Split Soil-Rock Log

Refer to explanatory notes for symbol and abbreviation definitions

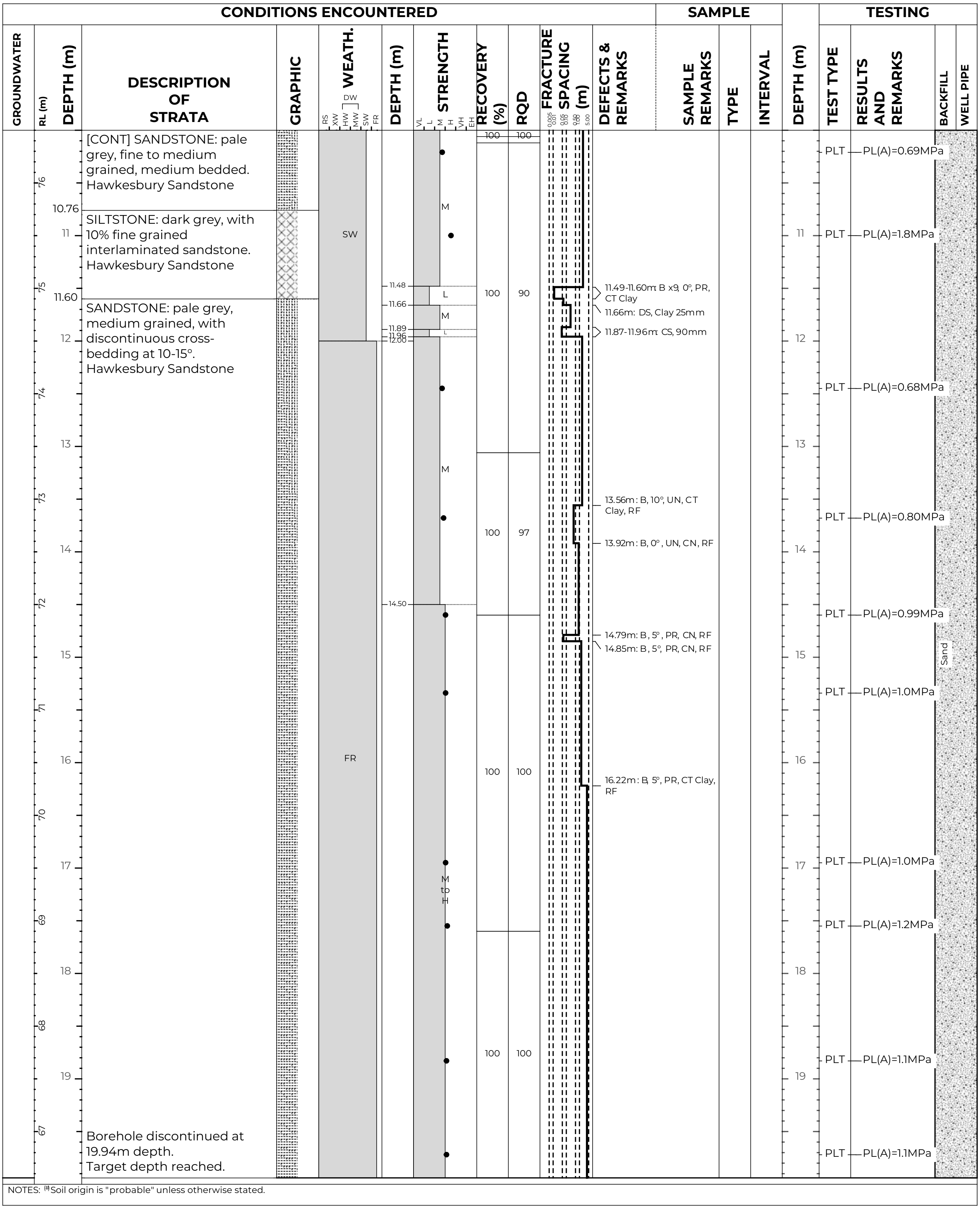
Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.5 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 3 of 3



[CONT] SANDSTONE: pale grey, fine to medium grained, medium bedded. Hawkesbury Sandstone

10.76 SILTSTONE: dark grey, with 10% fine grained interlaminated sandstone. Hawkesbury Sandstone

11.60 SANDSTONE: pale grey, medium grained, with discontinuous cross-bedding at 10-15°. Hawkesbury Sandstone

Borehole discontinued at 19.94m depth.
Target depth reached.

11.49-11.60m: B x9, 0°, PR, CT Clay
11.66m: DS, Clay 25mm
11.87-11.96m: CS, 90mm
13.56m: B, 10°, UN, CT Clay, RF
13.92m: B, 0°, UN, CN, RF
14.79m: B, 5°, PR, CN, RF
14.85m: B, 5°, PR, CN, RF
16.22m: B, 5°, PR, CT Clay, RF

PLT — PL(A)=0.69MPa
PLT — PL(A)=1.8MPa
PLT — PL(A)=0.68MPa
PLT — PL(A)=0.80MPa
PLT — PL(A)=0.99MPa
PLT — PL(A)=1.0MPa
PLT — PL(A)=1.0MPa
PLT — PL(A)=1.2MPa
PLT — PL(A)=1.1MPa
PLT — PL(A)=1.1MPa

Generated with CORE-GS by Geroc - Split Soil-Rock Log

NOTES: [a]Soil origin is "probable" unless otherwise stated.

PLANT: Bobcat
OPERATOR: Ground Test (GM)
LOGGED: J. Valencic
METHOD: DT to 0.1m, AD/T to 2.5m, WB to 3.1m, NMLC to 19.94m
CASING: HQ to 3.1m
REMARKS: Coordinates and elevation obtained via use of DGPS.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.5 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 1 of 2

3.10-8.00 m depth

8.00-13.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 86.5 AHD
COORDINATE: E:333929.3, N:6254779.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH04
PROJECT No: 233323.00
DATE: 13/01/25 - 14/01/25
SHEET: 2 of 2

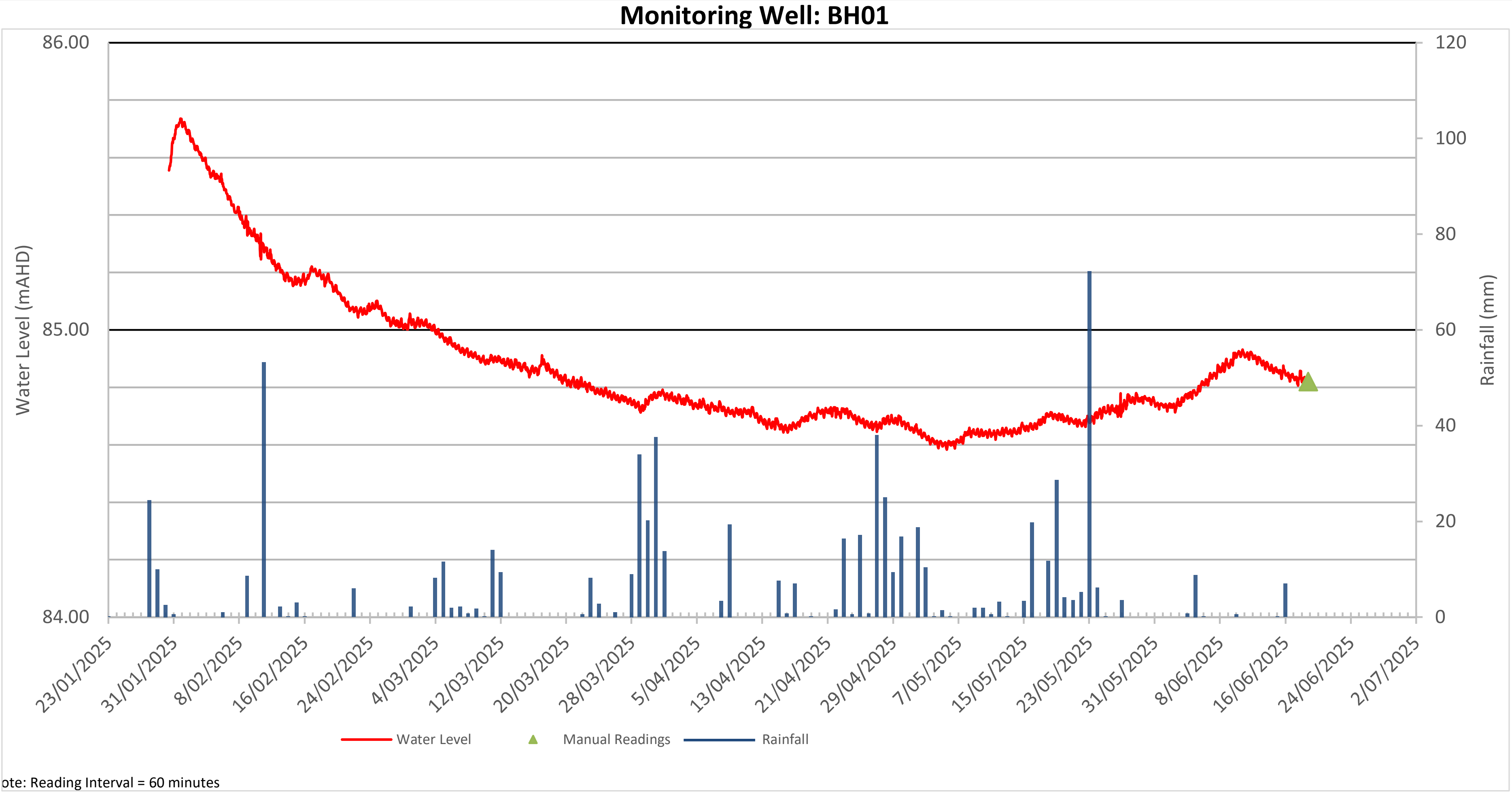
13.00-18.00 m depth

18.00-19.94 m depth

Generated with CORE-GS by Geroc - Split Soil-Rock Log

Appendix D

Field and Laboratory Test Results

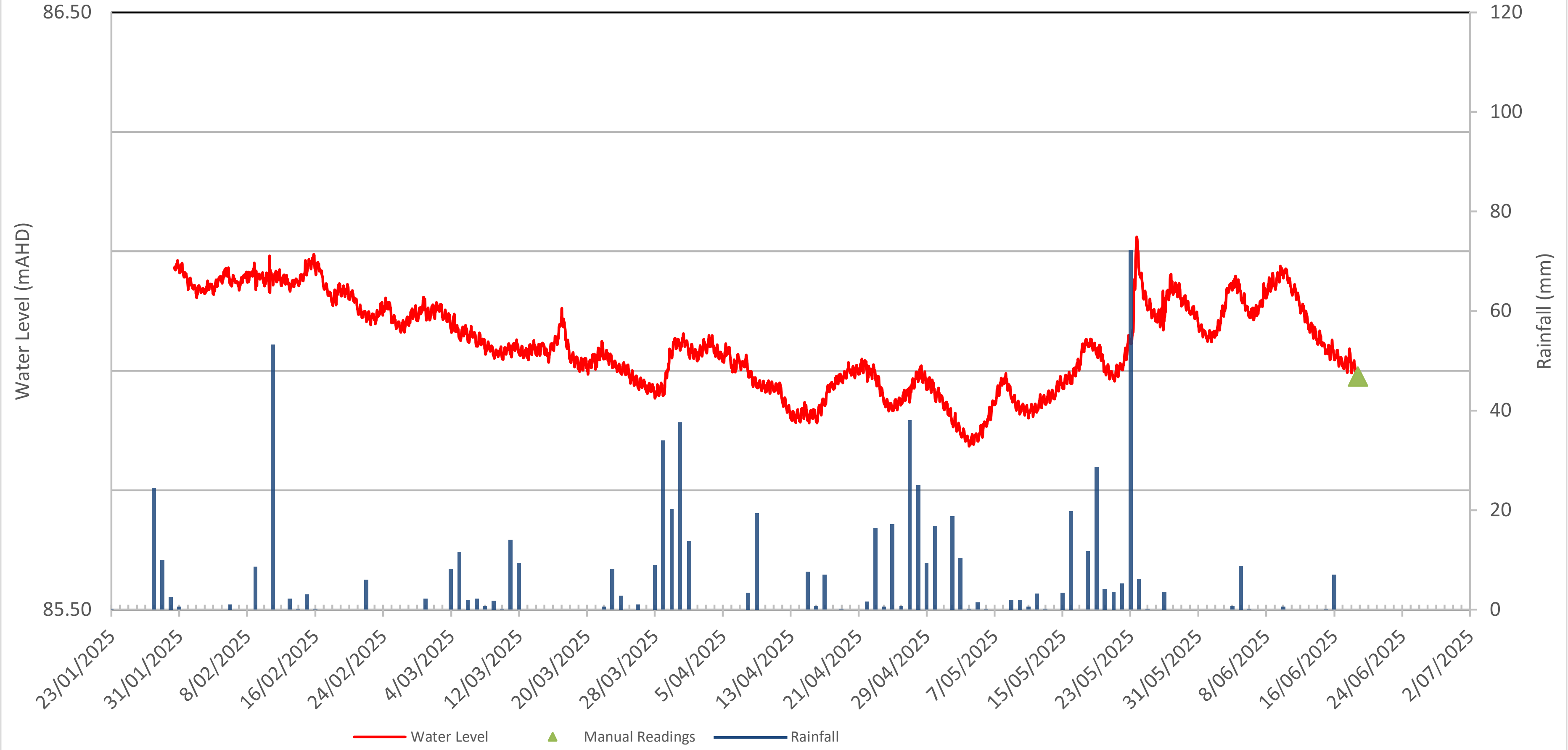


Note: Reading Interval = 60 minutes

Douglas PARTNERS

From	**Drawn:**
30/01/2025	RM
To	**Date:**
18/06/2025	19/06/2025

Monitoring Well: BH02

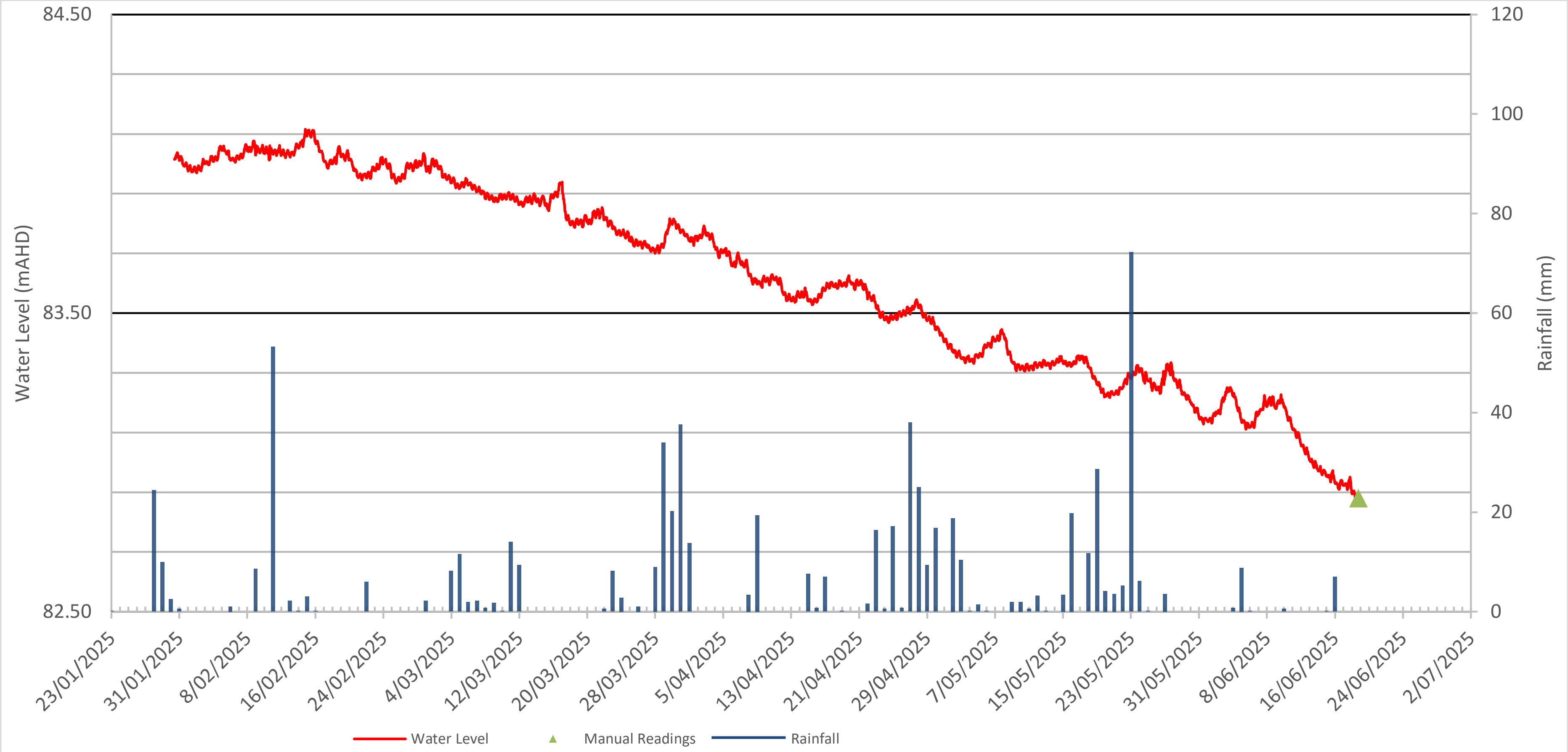


Note: Reading Interval = 60 minutes

Douglas PARTNERS

From	**Drawn:**
30/01/2025	RM
To	**Date:**
18/06/2025	19/06/2025

Monitoring Well: BH04



Note: Reading Interval = 60 minutes

Douglas
PARTNERS

From	**Drawn:**
30/01/2025	RM
To	**Date:**
18/06/2025	19/06/2025

Permeability Testing - Rising Head Test Report

Client:	Legacy Property Pty Ltd	Project No:	233323.00
Project:	Proposed Mixed Use Development	Test date:	28-Jan-25
Location:	253-265 Pacific Highway, North Sydney, NSW	Tested by:	JV

Test Location

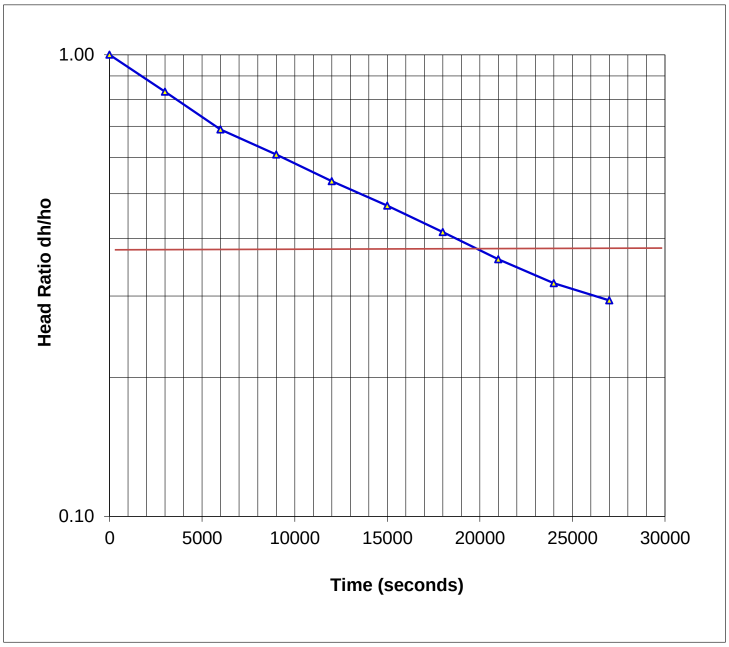
		Test No.	BH1	
Description:	Rising Head Test in well installed within borehole	Easting:	333916.80	m
Material type:	Sandstone	Northing	6254816.50	m
		Surface Level:	90.4	m AHD

Details of Well Installation

Effective diameter (2re)	50	mm	Depth to water before test	4.84	m
borehole diameter (2R)	75	mm	Depth to water at start of test	8.28	m
Effective Length of well screen (Le)	5.5	m	Depth of top of PVC standpipe	12.5	m
			Depth of base of PVC standpipe	18.0	m

Test Results

Time (sec)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	8.28	3.44	1.000
3000.00	7.7	2.86	0.831
6000.00	7.21	2.37	0.689
9000.00	6.93	2.09	0.608
12000.00	6.67	1.83	0.532
15000.00	6.46	1.62	0.471
18000.00	6.26	1.42	0.413
21000.00	6.08	1.24	0.360
24000.00	5.94	1.10	0.320
27000.00	5.85	1.01	0.294



To = 340.6 mins
20434 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

$k = [r^2 \ln(Le/R)]/2Le\ To$

where r = radius of casing
R = radius of well screen
Le = length of well screen
To = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity	**k =**	**1.4E-08**	m/sec
	=	**0.001**	m/day

Douglas Partners
Geotechnics / Environment / Groundwater

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au

Permeability Testing - Rising Head Test Report

Client:	Legacy Property Pty Ltd	Project No:	233323.00
Project:	Proposed Mixed Use Development	Test date:	28-Jan-25
Location:	253-265 Pacific Highway, North Sydney, NSW	Tested by:	JV

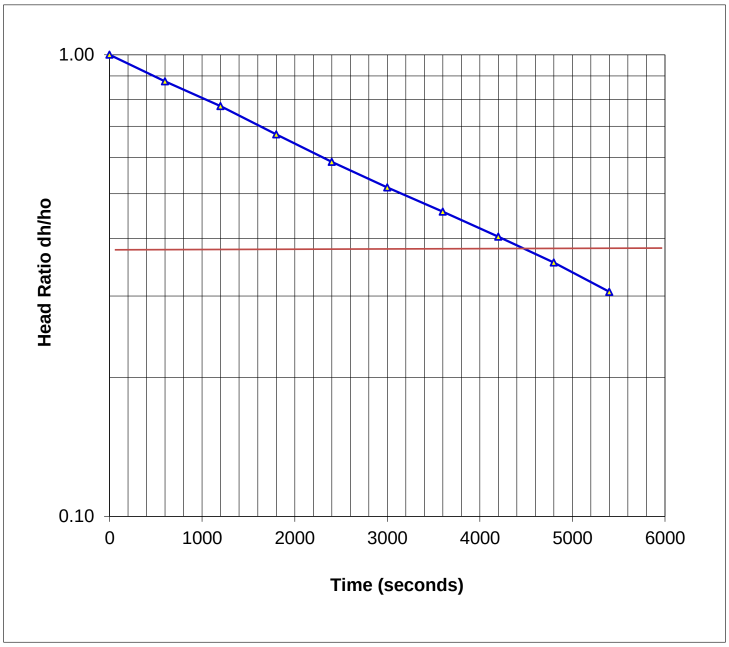
Test Location		**Test No.**	BH2	
Description:	Rising Head Test in well installed within borehole	Easting:	333902.10	m
Material type:	Sandstone	Northing	6254802.30	m
		Surface Level:	87.3	m AHD

Details of Well Installation

Effective diameter (2re)	50	mm	Depth to water before test	1.2	m
borehole diameter (2R)	75	mm	Depth to water at start of test	3.06	m
Effective Length of well screen (Le)	7.3	m	Depth of top of PVC standpipe	8.7	m
			Depth of base of PVC standpipe	16.0	m

Test Results

Time (sec)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	3.06	1.86	1.000
600.00	2.83	1.63	0.876
1200.00	2.64	1.44	0.774
1800.00	2.45	1.25	0.672
2400.00	2.29	1.09	0.586
3000.00	2.16	0.96	0.516
3600.00	2.05	0.85	0.457
4200.00	1.95	0.75	0.403
4800.00	1.86	0.66	0.355
5400.00	1.77	0.57	0.306



To = 76.9 mins
4612 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

$k = [r^2 \ln(Le/R)]/2Le\ To$

where r = radius of casing
R = radius of well screen
Le = length of well screen
To = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity	**k =**	**4.9E-08**	m/sec
	=	**0.004**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Legacy Property Pty Ltd	Project No:	233323.00
Project:	Proposed Mixed Use Development	Test date:	28-Jan-25
Location:	253-265 Pacific Highway, North Sydney, NSW	Tested by:	JV

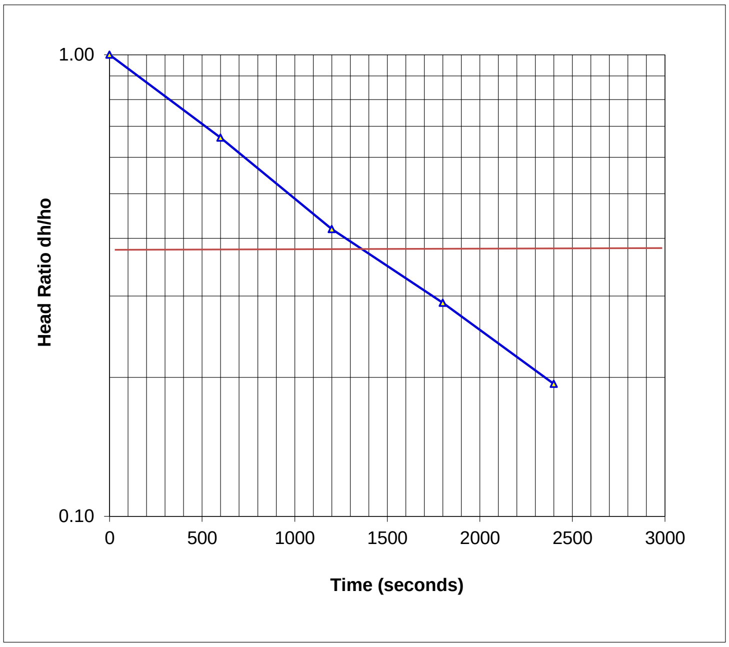
Test Location		**Test No.**	BH4	
Description:	Rising Head Test in well installed within borehole	Easting:	333929.30	m
Material type:	Sandstone	Northing	6254779.00	m
		Surface Level:	86.6	m AHD

Details of Well Installation

Effective diameter (2re)	50	mm	Depth to water before test	2.4	m
borehole diameter (2R)	75	mm	Depth to water at start of test	3.02	m
Effective Length of well screen (Le)	2.8	m	Depth of top of PVC standpipe	4.7	m
			Depth of base of PVC standpipe	7.5	m

Test Results

Time (sec)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	3.02	0.62	1.000
600.00	2.81	0.41	0.661
1200.00	2.66	0.26	0.419
1800.00	2.58	0.18	0.290
2400.00	2.52	0.12	0.194



To = 23.8 mins
1428 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

$k = [r^2 \ln(Le/R)]/2Le\ To$

where r = radius of casing
R = radius of well screen
Le = length of well screen
To = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity	**k =**	**3.4E-07**	m/sec
	=	**0.029**	m/day

Material Test Report

Report Number: **233323.00-1**
Issue Number: 1
Date Issued: 06/02/2025
Client: Legacy Property Pty Ltd
Level 45, MLC Centre, Sydney NSW
Contact: Peter Navratil
Project Number: 233323.00
Project Name: Proposed Mixed Use Development
Project Location: 253-265 Pacific Highway, North Sydney NSW
Work Request: 12079
Sample Number: SY-12079A
Date Sampled: 13/01/2025
Dates Tested: 15/01/2025 - 23/01/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: 125mm linear shrinkage mould used
Sample Location: **BH04 , Depth: 1.0-1.45m**
Material Source: Silty CLAY: pale grey

Douglas Partners Pty Ltd
Sydney Laboratory
96 Hermitage Road West Ryde NSW 2114
Phone: (02) 9809 0666
Email: andrew.hutchings@douglaspartners.com.au

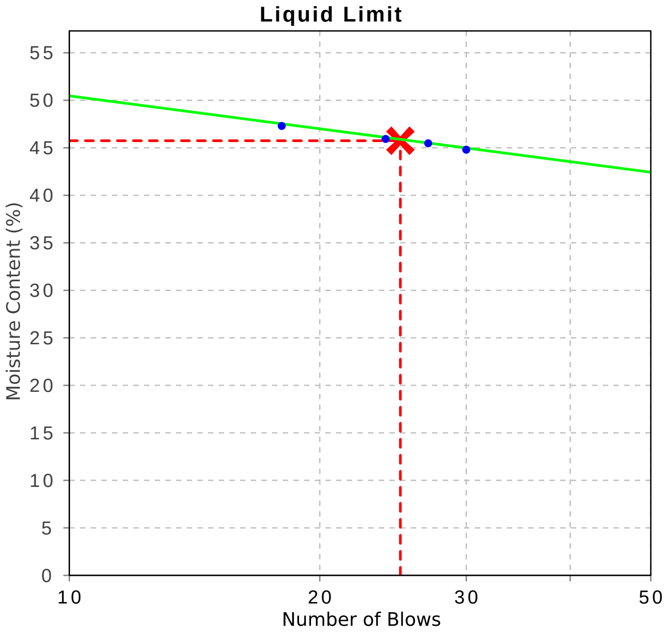
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Andrew Hutchings
Associate / Laboratory Manager
Laboratory Accreditation Number: 828

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	46		
Plastic Limit (%)	25		
Plasticity Index (%)	**21**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**9.5**		
Cracking Crumbling Curling	Curling		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	19.3		



Material Test Report

Douglas Partners Pty Ltd
Sydney Laboratory
96 Hermitage Road West Ryde NSW 2114
Phone: (02) 9809 0666
Email: andrew.hutchings@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

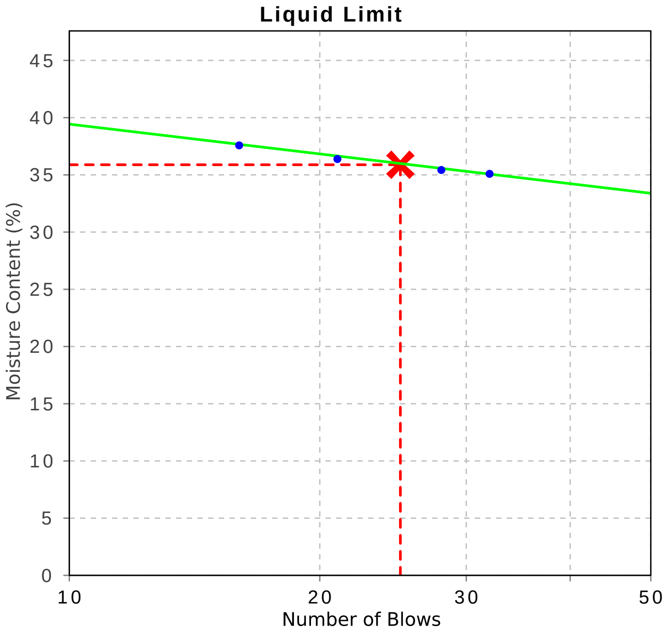
Approved Signatory: Andrew Hutchings
Associate / Laboratory Manager
Laboratory Accreditation Number: 828

Report Number: **233323.00-1**
Issue Number: 1
Date Issued: 06/02/2025
Client: Legacy Property Pty Ltd
Level 45, MLC Centre, Sydney NSW
Contact: Peter Navratil
Project Number: 233323.00
Project Name: Proposed Mixed Use Development
Project Location: 253-265 Pacific Highway, North Sydney NSW
Work Request: 12079
Sample Number: SY-12079B
Date Sampled: 13/01/2025
Dates Tested: 15/01/2025 - 23/01/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: 125mm linear shrinkage mould used
Sample Location: **BH04 , Depth: 2.5-2.95m**
Material: Silty CLAY: pale grey

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	36		
Plastic Limit (%)	26		
Plasticity Index (%)	**10**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**6.0**		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	18.8		



Material Test Report

Report Number: **233323.00-1**
Issue Number: 1
Date Issued: 06/02/2025
Client: Legacy Property Pty Ltd
Level 45, MLC Centre, Sydney NSW
Contact: Peter Navratil
Project Number: 233323.00
Project Name: Proposed Mixed Use Development
Project Location: 253-265 Pacific Highway, North Sydney NSW
Work Request: 12079
Sample Number: SY-12079C
Date Sampled: 13/01/2025
Dates Tested: 15/01/2025 - 04/02/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH3 , Depth: 0.1-0.25m**
Material: FILL/Gravelly CLAY: pale grey

Douglas Partners Pty Ltd
Sydney Laboratory
96 Hermitage Road West Ryde NSW 2114
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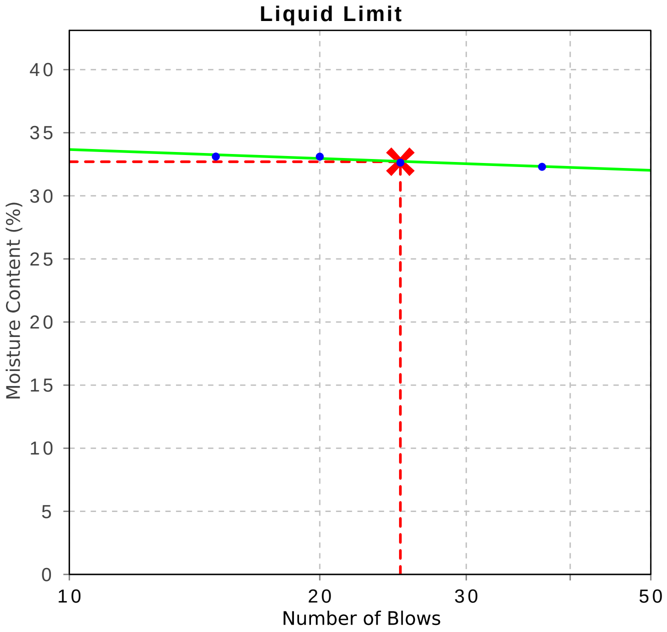
Approved Signatory: Andrew Hutchings
Associate / Laboratory Manager
Laboratory Accreditation Number: 828

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	33		
Plastic Limit (%)	22		
Plasticity Index (%)	**11**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**6.5**		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	19.4		



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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 371612

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joshua Valencic
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**233323.00 North Sydney**
Number of Samples	6 Soil
Date samples received	30/01/2025
Date completed instructions received	30/01/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	06/02/2025
Date of Issue	06/02/2025

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Priya Samarawickrama, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		371612-1	371612-2	371612-3	371612-4	371612-5
Your Reference	UNITS	BH04	BH04	BH01	BH02	BH02
Depth		1.00-1.45	2.50-2.95	0.2-0.4	0.4-0.7	0.15-0.4
Date Sampled		13/01/2025	13/01/2025	20/01/2025	20/01/2025	20/01/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
Date analysed	-	31/01/2025	31/01/2025	31/01/2025	31/01/2025	31/01/2025
pH 1:5 soil:water	pH Units	5.1	5.6	7.2	8.4	9.9
Electrical Conductivity 1:5 soil:water	µS/cm	41	47	130	140	230
Chloride, Cl 1:5 soil:water	mg/kg	<10	10	10	26	<10
Sulphate, SO4 1:5 soil:water	mg/kg	48	53	56	65	20

Misc Inorg - Soil		
Our Reference		371612-6
Your Reference	UNITS	BH03
Depth		0.8-0.9
Date Sampled		20/01/2025
Type of sample		Soil
Date prepared	-	31/01/2025
Date analysed	-	31/01/2025
pH 1:5 soil:water	pH Units	6.0
Electrical Conductivity 1:5 soil:water	µS/cm	73
Chloride, Cl 1:5 soil:water	mg/kg	35
Sulphate, SO4 1:5 soil:water	mg/kg	75

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			31/01/2025	1	31/01/2025	31/01/2025		31/01/2025	[NT]
Date analysed	-			31/01/2025	1	31/01/2025	31/01/2025		31/01/2025	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	5.1	5.1	0	102	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	41	42	2	98	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	<10	<10	0	111	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	48	48	0	112	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

MISC_INORG_DRY: pH/EC
Samples were out of the recommended holding time for this analysis.