
**Report on Groundwater Impact
Assessment**

Proposed Mixed Use Development

**253-265 Pacific Highway, North Sydney
NSW**

Prepared for Legacy Property Pty Ltd

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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.

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Report on Groundwater Impact Assessment Proposed Mixed Use Development 253-265 Pacific Highway, North Sydney NSW

1. Introduction

1.1 Purpose of this report

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a groundwater impact assessment undertaken for a proposed mixed use development at 253-265 Pacific Highway, North Sydney NSW (the site). The investigation was commissioned by email instructing to proceed dated 16 June 2025 from Peter Navratil of Legacy Property Pty Ltd and was undertaken in accordance with Douglas' proposal 233323.00.P.001.Rev0 dated 29 November 2024.

The purpose of this Groundwater Impact Assessment (GIA) is to support the submission of a State Significant Development Application (SSDA) (SSD – 84416958), addressing the assessment requirements specified in Section 1.3. Additionally, this document aims to assist in obtaining the necessary approvals for the disposal of extracted groundwater, where applicable.

A brief overview of the development is provided in Section 2. The site location is shown on Drawing 1, Appendix B.

This GIA is based on the findings of site-specific investigations and monitoring, including:

- Geotechnical investigation (Douglas, 2025); and
- Detailed (contamination) site investigation (DSI) (JBS&G, 2025).

The following key information is relevant to the preparation of this GIA:

- The proposed works will intercept the groundwater table;
- Groundwater levels on site have been observed at approximately RL 84.1 m to 86.1 m AHD;
- The Bulk Excavation Level (BEL) of the proposed basement is assumed to be between approximately RL 74.1 m and RL 75.6 m;
- The basement is intended to be drained; and
- The extracted groundwater will be disposed of via stormwater.

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

1.2 Regulatory framework and guidance

The following key guidelines and documents were consulted in preparation of this report:

- Groundwater assessment toolbox for Major Projects in NSW (NSW DPE, 2022);
- Guidelines for Groundwater Documentation for SSD/SSI Projects (NSW DPE, 2022);
- Minimum Groundwater Modelling Requirements for SSD/SSI Projects (NSW DPE, 2022); and

- Cumulative Groundwater Impact Assessment Approaches (NSW DPE, 2022).

Additional regulatory requirements may also apply, including WaterNSW approvals for water take and disposal (see Section 9), and local council or EPA conditions depending on the nature and location of discharge.

1.3 Conditions of approval

Conditions of approval are presented in Table 1.

Table 1: Compliance table

SEARs Item	Assessment Requirement	Report Section
12. Ground and groundwater conditions	Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site and including soil erosion.	Sections 4.8 and 8.2
	Where required, provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI, provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies	Sections 4 to 11

2. Proposed development

2.1 Proposed development and construction

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 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. It is expected that excavation depths of between 11 m and 16 m will be required to achieve BEL (assumed to be 0.5 m below FFL).

2.2 Proposed dewatering and discharge methods

We expect that dewatering of the site will be achievable via conventional sumps and pumps and is expected to be redirected and discharged into council stormwater drains.

3. 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 m² 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; and
- 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).

4. Hydrogeological setting

4.1 Topography

The site is located near the crest of a southeast facing hillside that slopes down toward a gully that naturally drains into Sydney Harbour located greater than 1 km away.

4.2 Climate

Generally subtropical climate, characterized by mild winters and hot, humid summers. The average annual rainfall is approximately 1.2 m.

4.3 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.

4.4 Hydrogeology and groundwater source

Based on the hydrogeological setting, the site is assumed to be underlain by the following groundwater systems:

- Aquitard within the clayey soil profile where perched groundwater could be present; and

- Minor fractured aquifers hosted by the underlying Hawkesbury Sandstone and Ashfield Shale bedrock. This rock formation typically acts as aquitards or aquicludes, although minor secondary permeability can occur where defects are present.

4.5 Hydrology

Sydney Harbour is located greater than 1 km away to the south, southeast.

4.6 Groundwater receptors

A search of the Bureau of Meteorology (BoM)'s groundwater dependent ecosystems Atlas (the GDE Atlas) has been undertaken to identify mapped GDEs within 500 m of the site. No GDE were identified within the search radius.

A groundwater bore search of the WaterNSW and Douglas database indicates that there is one registered water supply bore within 500 m of the site. The groundwater monitoring bore (GW115210) is located approximately 260 m to the southwest of the site and was drilled to a final depth of 4.5 m. The bore indicates a standing water level of 2.3 m depth.

4.7 Acid sulfate soils and salinity

Acid sulfate soils (ASS) risk mapping published by the NSW Department of Climate Change, Energy, the Environment and Water (1998) indicates the site contains no risk of ASS occurrence or presence. The geological environment and site levels are not consistent with the conditions required for ASS to be present. No further assessment of ASS is required for the site.

The NSW Salinity Potential map from the NSW Department of Infrastructure, Planning and Natural Resources does not indicate the site has any salinity potential. No further assessment or management of salinity is considered necessary.

4.8 Previous contamination reports

Reference should be made to the DSI report prepared by JBS&G Pty Ltd (JBS&G, 2025) dated June 2025.

JBS&G (2025) identified the following potential sources of contamination, and primary contaminants of potential concern for the site based on their review of the site history and use:

- 267 Pacific Highway (former service station and potential source of offsite contamination migration): total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene and xylenes (BTEX), volatile organic compounds (VOC) and heavy metals;
- 255-259 Pacific Highway (Bayer Pharma and car dealership / hire): TRH, BTEX, VOC, semi-volatile organic compounds (SVOC) and organochlorine pesticides (OCP); and
- Whole site: heavy metals, polycyclic aromatic hydrocarbons (PAH), asbestos, TRH, BTEX, OCP and polychlorinated biphenyls (PCB).

5. Investigation results

5.1 Geotechnical

A geotechnical investigation was undertaken by Douglas in June 2025 (233323.00.R.001.Rev1). The test locations are shown in Drawing 1 (Appendix B).

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.

5.2 Groundwater

Three groundwater wells were installed within the site. Groundwater results are summarised in subsequent sections.

Table 2 summarises the monitoring wells' attributes. Their location is shown on Drawing 1 (Appendix B).

Table 2: Monitoring well details

Well ID	Installation date	Surface (m AHD)	Screened Zone (m bgl)	Screened lithology
BH01	23/1/2025	90.4	13 - 18	Sandstone
BH02	21/1/2025	87.4	11.5 - 16	Sandstone
BH04	14/1/2025	86.5	5.5 - 7.5	Siltstone

Notes: m bgl: metres below ground level

5.2.1 Groundwater levels

No free groundwater was observed during auger drilling (maximum auger drilling depth to 3.1 m below ground level within BH04). The use of water for rotary drilling and coring prevented observation of groundwater during drilling within the rock.

Groundwater levels have been continuously recorded at hourly (or less for testing to capture groundwater recharge) intervals since 30 January 2025 using data loggers installed in the monitoring wells. Hydrographs showing recorded levels in comparison with rainfall data over time are presented in Appendix D.

The hydrographs indicate that the groundwater levels generally respond to rainfall events.

A summary of the maximum, minimum, average, and median groundwater levels recorded by the dataloggers are presented in Table 3.

Table 3: Summary of logger data

Well ID	Groundwater elevation (m AHD)			
	Lowest	Highest	Average	Median
BH01	84.6	85.7	84.9	84.8
BH02	85.8	86.1	85.9	85.9
BH04	82.9	84.1	83.6	83.6

Notes: m bgl: metres below ground level

5.2.2 Hydraulic Conductivity

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 E.

The permeability testing results are summarised in Table 4. The measured hydraulic conductivity values are similar to typical values commonly seen within similar rock formations in Sydney (Pells et. al., 2019, Classification of Sandstones and Shales in the Sydney Region: A Forty Year Review).

Table 4: Interpreted hydraulic conductivity results

Well ID	Tested lithology material	Hydraulic conductivity (m/s)
BH01	Sandstone	1.4×10^{-8}
BH02	Sandstone	4.9×10^{-8}
BH04	Siltstone	3.4×10^{-7}
Geometric mean		6.2×10^{-8}

5.3 Groundwater quality

Groundwater sampling and quality testing were undertaken as part of the DSI report (JBS&G, 2025), utilising the groundwater wells installed by Douglas at locations BH01, BH02 and BH04.

The results of the DSI are presented in Table 5.

Table 5: Summary of field parameters (groundwater and surface water)

Well / Sample ID	Total Depth (mbtoc)*	Depth to water (mbtoc)*	Temperature** (°C)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µS/cm)	pH	Redox (mV)	Comments
BH01	18.13	7.13	22.7	6.62	447	6.09	40	Light yellow. No odours or sheen.
BH02	15.90	0.64	22.4	5.59	864	5.92	32.7	Clear. No odours or sheen.
BH04	7.41	2.36	32.1	2.89	1238	5.29	66.8	Light brown. No odours or sheen.

Notes: *mbtoc – meters below top of well casing

** Groundwater monitoring was completed during a heat wave in Sydney, with monitoring events completed around mid-day which may have resulted in high recorded groundwater temperatures than normal.

The JBS&G (2025) groundwater laboratory results are provided in Appendix F. Douglas has compared these results with the Water Quality Acceptance Criteria (WQAC) adopted for this GIA (refer to Section 9.3.3) and note the following:

- Dissolved copper in all samples exceeds the ANZG 90% level of protection (LOP) for marine species (maximum concentration of 0.008 mg/L compared to the WQAC of 0.003 mg/L);
- Dissolved zinc in all samples exceeds the ANZG 90% LOP for marine species (maximum concentration of 0.27 mg/L compared to the WQAC of 0.012 mg/L);
- Trihalomethanes were detected in BH01. This comprised chloroform, which was recorded below the ANZG 90% LOP for marine species, and dibromochloromethane and

bromodichloromethane at concentrations considered by Douglas to be generally consistent with the potable water supply;

- TRH compounds were detected in BH01, at a concentration of 0.06 mg/L of TRH C6-C10 and 1.722 mg/kg TRH C10-C40. JBS&G (2025) noted that the 'Hydrocarbons and trihalomethanes in BH01 could be attributed to offsite migration sources e.g. urban industrial sources in the surrounding area or residual offsite migration of contaminants associated with the former service station activities at 267 Pacific Highway. In relation to hydrocarbons, the underlying natural shale geology may be a contributor. The low-level detections do not pose a risk to human health and/or are unlikely to pose a risk to aquatic ecosystems'; and
- All other analytes were below the laboratory limit of reporting.

JBS&G (2025) also noted that 'Groundwater samples collected during this GME are representative of the screened interval in the groundwater wells and may not be representative of pumped groundwater. The physical parameters e.g. pH, TDS, colour observed within the boreholes are likely representative of natural groundwater characteristics within the local geology. There is potential that there are higher solids, salts and sediment present naturally in siltstones, shales and sandstone which is reflected in the visual observations and TDS readings. There is also potential for residual fine sediment to be present from the borehole drilling method deployed which was unable to be cleaned out during well development which could be attributing to higher TDS levels observed. The acidic nature of the pH in the groundwater could be representative of deeper ground conditions with dissolved components present at depth e.g. carbon dioxide and therefore are more likely representative of natural ground conditions. When groundwater is pumped, this may result in changes to the pH from degassing and/or temperature changes.'

6. Conceptual hydrogeological model

The site is predominantly underlain by Hawkesbury Sandstone. The topography of the area predominately grades down toward the southeast into a gully feature that extends into the Sydney Harbour; the groundwater levels recorded within the monitoring wells indicate that the groundwater flow is typically toward the east.

The groundwater monitoring wells have recorded minor fluctuations and trends in response to rainfall events. The recorded groundwater levels were observed to be wholly within the bedrock profile.

The aquifer has been identified as unconfined where groundwater sources flowing into the subject site are considered to originate from rain and surface water infiltration. Over time, these water sources permeate to the natural groundwater that has been observed to be within the bedrock profile.

It should be noted that groundwater levels are transient and fluctuate with climatic variations and other factors (e.g. adjacent excavations, pumping). Therefore, the water levels will temporarily rise during periods of heavy or prolonged rainfall and fall during dry periods. Groundwater levels can also be affected by the amount of pumping occurring in groundwater extraction bores in the aquifer although these have not been identified in the area.

7. Groundwater inflow assessment

7.1 Numerical modelling methodology

A 2-dimensional (2D) numerical model was developed for the proposed excavation using SEEP/W, a component of GeoStudio 2023.1.2 R2 (version 23.1.2.11) developed by GEOSLOPE International Ltd. Steady state and transient analysis were undertaken to assess the potential dewatering rates and volumes during excavations works and for a long-term drained basement.

Douglas selected a single vertical cross-section in a roughly north to south direction, intercepting the basement footprint through the centre of the excavation, as shown in Figure 1. The ground surrounding the proposed basement was simulated as being a multi-layered numerical model to represent the general subsurface conditions to allow the vertical flow components to be simulated more accurately.

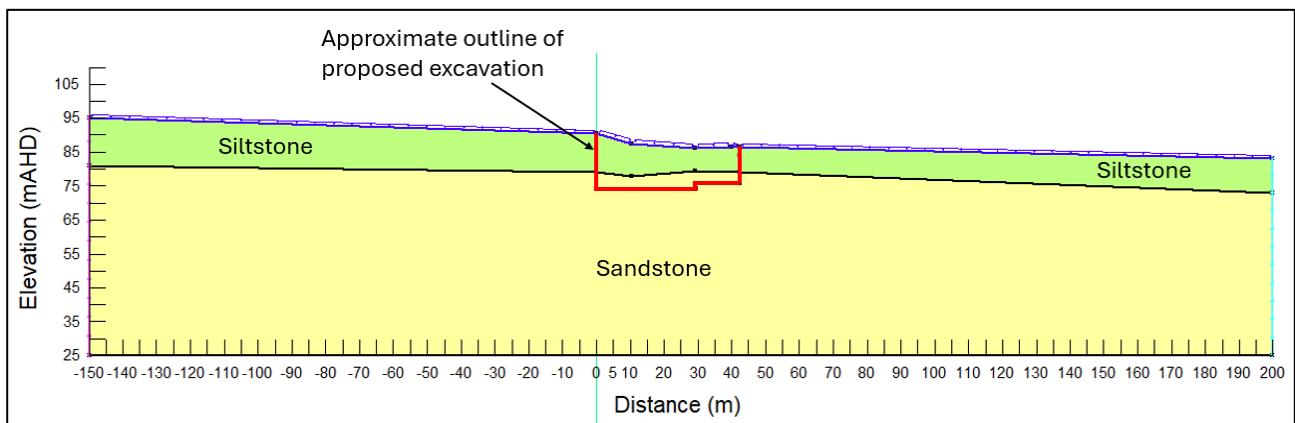


Figure 1: SeepW model of site showing layer strata.

The geological units were subdivided into layers corresponding to the primary rock units for the numerical model. As the groundwater was observed only within the bedrock profile, the surficial soils were excluded from the model and considered negligible for the purpose of this assessment. Each material was assigned different hydraulic conductivities (permeabilities) to better represent the vertical migration of groundwater flow. The parameters adopted (Table 6.) were taken as the highest of the testing results for sandstone and a conservative value for fractured siltstone.

7.1.1 Model layers

The hydrogeological units were simulated as two layers. Adopted hydraulic properties (base case) are presented in Table 6. Parameters were selected based on the results of the hydraulic conductivity testing (Section 5.2.2), ranges of values documented in the available literature for similar lithologies (e.g. Hoek & Bray 1981 and more recently Pells 2019) and previous experience with similar materials. We note that the siltstone bedrock within BH04 was observed to be the least fractured of the three cored boreholes, and therefore we have adopted a slightly higher hydraulic permeability value for siltstone.

Table 6: Summary of material parameters for groundwater inflow analysis

Geological Unit	Saturated Kh (m/s)	Anisotropy Ratio (Kv/Kh)	Residual Water Content (%)	Material Model Adopted
Siltstone	1.0×10^{-6}	0.5	7	Unsaturated / saturated
Sandstone	4.9×10^{-8}	0.2	2	Unsaturated / saturated

Notes: Kh: Horizontal hydraulic conductivity
Kv: Vertical hydraulic conductivity

7.2 Model calibration – initial heads

Groundwater levels were established in the model by setting constant head conditions at the lateral extents and applying a surface flux along the upgradient ground surface. The model was calibrated to roughly match the hydraulic gradient (effective total head) observed within the groundwater monitoring. An infiltration rate of $7.6 \times 10^{-10} \text{ m}^3/\text{s}/\text{m}^2$ was adopted to simulated infiltration and seepage from rainfall and other potential sources (i.e. leaking services).

A ‘free flow’ boundary or ‘drained’ boundary condition (i.e. $0 \text{ m}^3/\text{sec}$ flow) was applied to the base and the sides of the basement excavation to model a ‘dry’ excavation which will be required during construction.

7.3 Sensitivity analysis

A sensitivity case was analysed whereby the horizontal (k_h) permeability was increased by a factor of 5. The sensitivity case was calibrated so that the hydraulic gradient prior to construction was approximately equivalent to the water levels observed within the wells.

7.4 Groundwater modelling results

Groundwater inflow into the excavation was assessed adopting transient and steady-state analysis to simulate dewatering during excavation and for the long term, respectively. The model assumes excavation and dewatering to target depth is instantaneous, resulting in substantial predicted inflows during the first days of construction.

The inflow rates represent the estimated total rate of groundwater flowing into the excavation and the volume (per unit time) requiring extraction via the dewatering system to dewater the excavation during construction.

The SEEP/W results are based on a two-dimensional model, which assumes the excavation is much longer than its width. The methods proposed by Kavvas et al (1992), shown in Equation 1, were used to adjust the 2D results to allow for the actual length to width ratio of the proposed basement. For the assessment, a width of 42.1 m and length of 22.6 m was adopted.

Equation 1

$$\frac{q_o}{q} = 0.7 + 0.3 \left(1 - \frac{B}{L} \right)$$

where: q_o is the predicted 'realistic' inflow rate
 q is the inflow rate from 2D modelling
 B is the width of the excavation
 L is the length of the excavation

7.4.1 Predicted groundwater inflow

The results from the inflow analysis summarised in the below Table 7 and Table 8. These tables present the estimated inflow rates and cumulative volumes of groundwater into the excavation during construction.

Table 7: Summary of groundwater inflow analysis for base case

Elapsed Time (day)	Dewatering Inflow Rate		
	Volume (m ³ / day)	Inflow rate (L / min)	Cumulative Inflow (ML)
3	9.1	6.3	0.03
8	6.7	4.6	0.07
14	5.3	3.7	0.10
25	4.1	2.9	0.15
41	3.4	2.4	0.21
65	2.9	2.0	0.29
101	2.4	1.7	0.39
156	2.1	1.4	0.51
239	1.8	1.3	0.67
365	1.7	1.2	0.89
Post-construction (long term)	1.4	1.0	0.5

Table 8: Summary of groundwater inflow analysis for sensitivity case (increased k_h permeability)

Elapsed Time (day)	Dewatering Inflow Rate		
	Volume (m ³ / day)	Inflow rate (L / min)	Cumulative Inflow (ML)
3	32.3	22.4	0.1
8	20.9	14.5	0.2
14	16.5	11.5	0.3
25	13.2	9.2	0.5
41	11.3	7.8	0.7
65	10.2	7.1	1.0
101	9.4	6.6	1.3
156	9.0	6.3	1.8
239	8.7	6.0	2.6
365	8.5	5.9	3.6
Post-construction (long term)	7.7	5.3	2.8

It should be noted that these volumes are ‘estimates’ of the average inflows. It is possible that localised zones of higher permeability may be present within the site, through which the rate of inflow could be significantly higher, and considering the subsurface heterogeneity and fractured aquifer system, a safety margin for application in the field should be considered.

Also, simulated dewatering rates and drawdown are dependent on the dewatering scheme adopted for the site, and construction design (e.g. shoring walls), as included in the numerical models. If the depth of basement level and dewatering systems were to change then the currently predicted dewatering rates may change, in which case further modelling would be required.

7.5 Drawdown and Settlement

Groundwater levels immediately outside the basement excavation are expected to be drawdown to BEL and by up to approximately 4 m at a distance of 40 m from the excavation as shown in Figure 2 below. As the basement is drained, there will be no mounding occurring. There are no expected settlement impacts to surrounding properties from drawdown as the groundwater is contained within and flowing through the fractured bedrock profile. The thin layer of overlying surficial fill and residual clay soils are not expected to undergo any consolidation as a result of the construction dewatering.

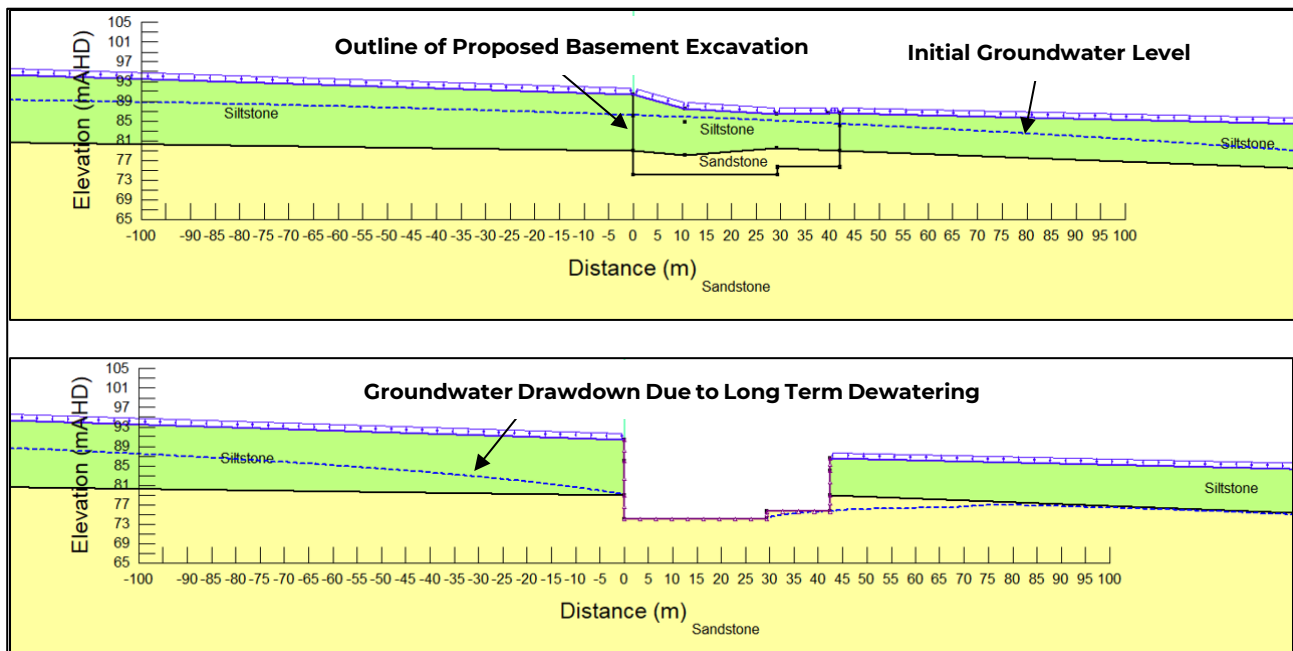


Figure 2: Simulation of initial steady state (upper image) and excavation with drawdown (lower image)

7.6 Review of hydrogeological concept model

The predicted inflows are less than 3 ML, estimates only and variation must be expected. Actual inflows will only be known at the time of excavation and dewatering. Further analysis would be required following the conclusion of long-term groundwater monitoring. The model will need to be reviewed when the excavation works commence and the actual inflows are known.

8. Impact assessment

8.1 Aquifer Interference Policy Assessment

The NSW Aquifer Interference Policy (AIP) indicates that the term “aquifer” is commonly understood to mean a groundwater system that is sufficiently permeable to allow water to move within it, and which can yield productive volumes of groundwater. A groundwater system is defined as any type of saturated geological formation that can yield low or high volumes of water. However, for the purpose of the AIP, the term aquifer has the same meaning as groundwater system and includes low yielding and saline systems.

Table 1 in Section 3.2.1 of the AIP outlines minimal impact considerations. The AIP indicates that “if predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable”. The following minimal impact considerations are outlined for less productive porous and fractured rock groundwater sources:

- Less than or equal to 10% cumulative variation in water table 40 m from any high priority GDE or high priority culturally significant site;
- A cumulative pressure head decline of no more than a 2 m at any water supply work; and

- Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

8.2 Environmental risk assessment

An assessment of the potential effects of dewatering on neighbouring properties and groundwater receptors has been summarised in Table 9.

Table 9: Assessment of potential effects of dewatering

Item	Comment
Impacts on potential GDEs	There are no GDEs within 500 m of the site (Section 4.6).
Water supply losses by neighbouring groundwater users	There are no registered water supply bores within 500 m of the site (Section 4.6).
Potential subsidence of neighbouring structures	Groundwater drawdown is predicted to mostly occur within the rock units with high deformation moduli. Therefore, risk of subsidence due to lowering of the water table is expected to be negligible.
Mounding of water upgradient of structure	As the basement is proposed to be drained, mounding of groundwater is not expected upgradient of the site.
Water quality	<p>Based on the available testing results (refer to Section 5.3), the extracted groundwater will require treatment (via conventional methods) prior to disposal to stormwater to manage potential impact on the receiving water body.</p> <p>The site topography indicates that the natural groundwater flow direction is likely to have been to the southeast and naturally draining toward the Sydney Harbour.</p> <p>Whilst the DSI indicates a history of potentially contaminating activities around the site, the potential for impact on migration of contaminated groundwater (if any) greater than 40 m from the site is expected to be negligible. Furthermore, no beneficial groundwater use or sensitive receptors have been identified within 500 m of the site.</p>
Contamination risk	The contamination risk for the dewatering comprises the potential for untreated groundwater discharge into an aquatic ecosystem if not appropriately treated prior to discharge.

Item	Comment
ASS	<p><u>On-site</u> Refer to Section 4.7. Acid Sulphate Soils (ASS) is not considered to be present on the site. As such no further on-site assessment or management is considered warranted.</p> <p><u>Off-site</u> For Class 5 land, development consent is required for works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.</p> <p>The predicted groundwater drawdown (Section 7.5) indicates that the drawdown will be in bedrock and that the 1 m drawdown level will not extend to lands below 5 m AHD. As such, no management is considered warranted for off-site ASS.</p>
Salinity	Refer to Section 4.7. No further assessment or management of salinity is required.

Based on the findings of this assessment, the impacts from dewatering for the proposed development are below than the minimum impact requirements outlined in the AIP and therefore, the impact are considered low to negligible.

9. Recommended management strategy

9.1 General

Dewatering will be required during the construction of the project. This section outlines the proposed management strategy based on the preferred methodology for dewatering and disposal.

The proposed dewatering and discharge approach is outlined in Section 2.2 and forms the basis of the groundwater inflow assessment and impact assessment given in Section 7 and 8, respectively.

Appropriate management strategies will be required during construction and operation, to ensure that the impact and inflows arising from dewatering remain within the expected values.

9.2 Groundwater inflow control

9.2.1 Control measures and monitoring

Effective management and monitoring of groundwater inflow should be undertaken to support safe excavation, minimise impacts and satisfy the regulatory requirements. The proposed control measures will be selected based on site-specific hydrogeological conditions, construction methodology and relevant guidelines, and will be detailed in construction drawings and specifications.

Groundwater inflow control measures may include:

- Perimeter drainage to capture and divert groundwater; and
- Inflow reduction measures such as grouting of joints or ground improvement.

Groundwater level and inflow monitoring should be undertaken during construction to:

- Validate inflow predictions and performance of control measures;
- Ensure drawdown remains within acceptable limits to prevent environmental or structural impacts; and
- Implement trigger contingency responses if unexpected inflow or impacts occur.

More information on recommended monitoring is provided in Section 9.4.

9.2.2 **Trigger levels**

Control measures will be monitored against two key thresholds:

- Volume trigger: inflow exceeds the maximum predicted by sensitivity modelling (Section 7); or
- Drawdown trigger: groundwater drawdown exceeds RL 0.5 m (beyond expected values) at any monitoring well.

If either trigger is reached, dewatering and excavation must be halted and a mitigation strategy (e.g. grouting) be implemented before work resumes or further assessment undertaken to justify the exceedance.

9.3 **Water quality control**

Groundwater inflows would require disposal. As outlined in Section 2.2, the preferred disposal option is discharge to the stormwater, subject to approval from relevant authorities, and appropriate testing and treatment as described in subsequent sections.

9.3.1 **Proposed testing**

Groundwater quality must be tested prior to discharge to prevent contamination of the receiving water body.

The recommended methodology for water quality testing is as follows:

- Collection of water samples and quality control samples from the inlet (as required) and outlet (all sampling events) of the treatment system;
- Measurement of general groundwater physical parameters (EC, pH and temperature) using a calibrated water quality meter;
- Analysis of the samples by a NATA accredited laboratory for the analytes presented in Table 10 below; and
- Review and update of the parameters being tested and this water quality testing methodology as required. The testing regime will only be reduced with the approval of North Sydney Council.

Water quality sampling should be conducted in accordance with Geoscience Australia’s Groundwater Sampling and Analysis – A Field Guide (Geoscience Australia 2009), where applicable.

Quality assurance / quality control (QA/QC) procedures should be used to establish accurate, reliable and precise results. QA/QC procedures should include: calibration of equipment, analyses of samples within holding times, keeping samples chilled and wearing gloves during sampling.

Table 10: Proposed suite of analytes for water quality monitoring

Category	Analytes
Field parameters	Temperature, EC, pH, turbidity
Physical properties	TDS, TSS
Metals (total)	Arsenic, aluminium, cadmium, chromium, copper, mercury, manganese, nickel, lead and zinc
Organics	TRH or TPH, BTEX, naphthalene (all events) VOC, OCP, OPP, PCB (during commissioning, and then monthly if no exceedances of WQAC recorded, otherwise continue monitoring for all events)

Notes: EC: electrical conductivity | TDS: total dissolved solids | TSS: total suspended solids
TRH: total recoverable hydrocarbons | TPH: total petroleum hydrocarbons
BTEX: benzene, toluene, ethylbenzene and xylenes
PAH: polycyclic aromatic hydrocarbons
VOC: volatile organic compounds

9.3.2 Discharge options and contingency measures

Management options for groundwater disposal are presented in Table 11.

Based on groundwater quality testing and predicted dewatering rates, Option 1 (disposal to stormwater) is considered feasible. The other two options listed in Table 11 are provided as contingency plans.

Table 11: Summary of possible management options

Management Option	Comments
<u>Option 1</u> : On-site treatment (if required) and disposal to stormwater.	Generally applicable where the treatment required is routine e.g. solids removal, alum dosing and pH adjustment. Treatment of specific contaminants may require more physical space and result in higher treatment costs. Stormwater disposed water is typically required to meet general NSW DPE requirements (NSW DPE 2021 & 2022), ANZG (2018) water quality standards for the relevant receiving water body and any associated uses (Section 9.3.3). Further requirements may be enforced depending on the specific approval documentation.

Management Option	Comments
<p><u>Option 2:</u> * Disposal to the sewer under a Trade Waste Agreement with Sydney Water.</p>	<p>Generally, will require further negotiation and establishment of water quality criteria prior to disposal. Water quality screening levels will depend on the specific trade waste agreement with Sydney Water.</p>
<p><u>Option 3:</u> ** Taken off-site for disposal at an aqueous treatment plant by a suitably licenced contractor.</p>	<p>May be suitable for more heavily contaminated liquids where on-site treatment is not practicable. Appropriate as a contingency strategy. Can be limited in applicability for larger volumes of water. Water quality screening levels will depend on specific requirements of the contractor.</p>

Notes: * Sydney Water has a general policy of only issuing a trade waste agreement for disposal of water from excavations where all other options have been exhausted.
** Off-site disposal of water by a tanker is generally only considered suitable in cases where periodic / batch disposal of groundwater is required (e.g. ephemeral water sources / rainfall / minor seepage only). Where continuous discharge is anticipated, this option is not feasible from an economic and / or environmental (i.e. emissions) perspective given the requirement to transport large volumes via truck at distance. It may be considered as a contingency strategy if any notable contamination which may be outside the operating capacity of the on-site treatment system is identified prior to disposal.

9.3.3 Water quality acceptance criteria

Groundwater quality results should be assessed against water quality acceptance criteria (WQAC) for each analyte prior to disposal. The WQAC should be chosen based on the receiving receptor's water quality, relevant guidelines and Council's requirements.

In line with North Sydney Council's stormwater system and WaterNSW's requirements, the following assessment criteria are recommended as a screening level for disposal to stormwater:

- ANZG, 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018' (ANZG, 2018):
 - o 90% level of protection (LOP) for non-bioaccumulating contaminants for marine ecosystems; and
 - o 95% LOP for bioaccumulating contaminants for marine ecosystems.
- ANZECC, 'Australian Water Quality Guidelines 2000', Tables 3.3.2 to 3.3.3 Default trigger values for physical and chemical stressors in southeast Australia for slightly disturbed ecosystems (ANZECC, 2000)(where more up to date values are not available).

The LOP above have been adopted based on the highly disturbed nature of the ecosystem in Sydney Harbour. Sydney Harbour is an estuarine system, and as such default guidelines values (DGV) for marine ecosystems are considered to provide suitable WQAC.

In relation to TRH (which was detected as discussed in Section 4.8), no high reliability DGV are available. As such results will be screened with reference to:

- the laboratory practical quantitation limit (PQL);
- visual and olfactory indicators such as oily sheens and hydrocarbon odours;
- thresholds provided in Schedule 2 of the *Airports (Environment Protection) Regulations 1997*; and

- where minor detections are recorded, further assessment of the risk may be conducted by the Environmental Consultant to assess the significance of the results with respect to potential impacts on the receiving waters.

The adopted treatment technology should be suitable to treat the extracted water to the above guideline levels.

9.3.4 Treatment options

Potential treatment options for managing groundwater quality prior to discharge may include:

- Sediment control: Settling tanks or flocculation to reduce turbidity and suspended solids.
- pH adjustment: Dosing with lime or acid to achieve acceptable discharge pH.
- Hydrocarbon removal: Use of oil-water separators and activated carbon filters.
- Metals removal: Filtration or chemical precipitation, if metal concentrations exceed guidelines.

The treatment system will be designed by the dewatering contractor based on construction specifications, groundwater quality results and the WQAC. A detailed treatment schematic will be provided in the detailed groundwater plan prior to construction.

9.4 Monitoring and reporting requirements

The following monitoring program and associated reporting is to be adopted until the end of excavation and construction works on-site. Groundwater level monitoring should be continued one month after construction.

Monitoring should be undertaken in a minimum of three monitoring wells unless approval from the consent authority is obtained to delete this requirement given the low risk associated with drawdown in rock. It is recommended that where possible, the existing monitoring wells used for the groundwater investigation be used during and after construction. Any wells damaged during construction should be replaced in a timely manner.

Table 13: Monitoring and reporting requirements

Item	Monitoring requirements	Methodology
Visual inspection	No visible oil and grease, sheen, significant discolouration or odours.	Daily inspections (by contractor). HOLD POINT - If indicators are observed, discharge must be suspended pending analytical confirmation.

Item	Monitoring requirements	Methodology
Groundwater level monitoring	Monitor drawdown at a minimum of three wells in the vicinity of the site unless approval is obtained to delete this requirement.	<ul style="list-style-type: none"> • Continuous groundwater level monitoring using data logger (minimum six-hourly frequency). • Quarterly manual readings. • Monitoring to continue for one month post-construction dewatering. <p>HOLD POINT - If drawdown exceeds predictions by >2 m, construction must be halted and contingency measures activated.</p>
Water quality sampling and testing	<p>Sampling of treated water to assess compliance with the WQAC.</p> <p>Additional sampling at dewatering points sumps to be collected as required to inform treatment requirements</p>	<p>Frequency</p> <p>Commissioning of treatment equipment:</p> <ul style="list-style-type: none"> • Treated water: every second day of treatment until all parameters meet WQAC. • Untreated water: at least three sampling events, either during initial commissioning and/or first three events once discharge has commenced. <p>Following commissioning:</p> <ul style="list-style-type: none"> • Treated water: Weekly (for continuous discharge) or prior to each discharge event (batch-based treatment and discharge). • Untreated water: as required to inform treatment. <p>Monitoring</p> <ul style="list-style-type: none"> • Parameters for measurement as per Section 9.3.1. • Sampling and measurement of field parameters by the Environmental Consultant. • Laboratory analysis by a NATA-accredited laboratory. • Chain of Custody (COC) documentation to accompany all samples. • Results to be included in final dewatering completion report. <p>HOLD POINT - If water WQAC, Environmental Consultant must review and assess risk. Where potentially unacceptable risk identified discharge must be halted and managed per contingency strategy.</p>

Item	Monitoring requirements	Methodology
Quality control sampling	Replicate sampling to verify lab result accuracy.	<ul style="list-style-type: none"> Conducted on 10% of samples. Testing suite: total metals, TRH, BTEX, naphthalene. COC documentation to accompany all samples. Results to be included in final dewatering completion report.
Quantity of groundwater inflows	Measurements of groundwater volumes (as per Section 9.2).	<ul style="list-style-type: none"> Weekly monitoring and reporting of groundwater abstraction volumes. Results to be included in final dewatering completion report. <p>HOLD POINT - If volumes exceed trigger levels or Council discharge allowance, works must be halted to minimise inflow (e.g. via grouting).</p>
Dewatering completion report	Final documentation of the dewatering program.	<p>Prepared by a suitably qualified consultant and to include:</p> <ul style="list-style-type: none"> Summary of contractor records (e.g. visual inspections, unexpected finds) Full analytical and quality control results. Records of dewatering volumes. Commentary on compliance and any non-conformances with the GIA.

Notes: Testing frequency, assessment criteria and analysis requirements may be reviewed in consultation with the Environmental Consultant based on ongoing results.

9.5 Personnel and responsibilities

Table 14 below outlines the proposed project personnel and relevant responsibilities as part of the management plan.

Table 14: Personnel and responsibilities

Role	Responsibilities
Site Manager / Contractor	Routine visual inspection. Monitoring / recording of dewatering / discharge volumes. Maintaining any unexpected / contingency records.
Dewatering Contractor	Design / specification and ongoing maintenance of the dewatering system.
Geotechnical Consultant	Groundwater level monitoring and review of disposal volumes. Assist in preparation of the dewatering completion report.

Role	Responsibilities
Environmental Consultant	Water quality sampling (analysis using NATA accredited laboratories). Interim advice for each sampling event to confirm (or otherwise) compliance with discharge requirements. Quality control sampling. Assist in preparation of the dewatering completion report.

9.6 Contingency plan

As per Section 9.3.4, at any hold point if any non-conformance is encountered then dewatering will be suspended. The following general contingency plan will be enacted:

- Communication of any identified issues of concern between the Site Manager / Contractor, Geotechnical Consultant and Environmental Consultant as required to address the issue;
- Should dewatering volumes be higher than predicted or higher than discharge limits provided by relevant authorities, suspend construction and reduce pumping rates. Options could include grouting to reduce groundwater inflows;
- Should water quality be deemed unsuitable for disposal to stormwater, suspend discharge (and dewatering if required) and further treat water prior to discharge, or adopt alternative disposal option;
- Environmental Consultant to inspect the site / unexpected finds and collect additional water quality samples as required (to be determined by the Environmental Consultant);
- Off-site tankering may be adopted to meet disposal requirements; and
- Written confirmation by the Environmental Consultant that water quality meets the WQAC (e.g. upon receipt of laboratory results), to support approval to recommence discharge.

10. Approvals and licensing

This section outlines the approvals, licences and other authorisations required for the proposed dewatering activities, consistent with the *Water Management Act 2000*, WaterNSW requirements, and any relevant local council or EPA obligations.

10.1 Water Access Licence (WAL) and entitlements

Dewatering of groundwater for construction purposes constitutes an aquifer interference activity under the *Water Management Act 2000* and may require a Water Access Licence (WAL) and appropriate water entitlement units (share and extraction components), depending on the water source and proposed take.

As the predicted groundwater inflows into the proposed basement is less than 3 ML per year, the development does not require a WAL as it meets exemption under Clause 21(2) of the Water Management (General) Regulation 2018.

10.2 Water Supply Works Approval (WSWA)

As the project is for an SSDA it is exempt from a water supply work approval (WSWA, under the *Water Management Act 2000*). The exemption is typically granted through the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) for SSDA projects.

10.3 Council and EPA approvals

Depending on the proposed discharge route and water quality:

- Discharge to stormwater: Council approval may be required. Acceptance criteria typically align with ANZG guidelines and site-specific conditions – refer to Section 9.3.
- Discharge off-site: A licensed contractor must be engaged, and records of transport and disposal must be maintained – refer to Section 9.3.

11. Conclusion

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. It is expected that excavation depths of between 11 m and 16 m will be required to achieve BEL (assumed to be 0.5 m below FFL). The proposed basement is expected to be designed as drained with groundwater discharging into the council stormwater.

The maximum recorded groundwater levels and conservative horizontal permeability values have been adopted to model and carry out a 2D seepage analysis for the proposed development. The results of the baseline analysis indicate that the predicted annual inflow into the drained basement is 0.5 ML. The cumulative inflow for the 12-month construction dewatering period has been estimated to be in the order of 0.9 ML, using the baseline modelling scenario. As the predicted inflow rate is less than 3 ML per year, a WAL will not be required.

Based on the sensitivity case modelling results where horizontal permeability values were increased by 5 x, which are considered unlikely, inflows could be more than 3 ML over the 12-month construction period under adverse conditions. If groundwater inflows are higher than expected, then grouting may be required to reduce and keep inflows below 3 ML/year or a WAL may be required.

Disposal of the groundwater seepage should be managed appropriately with the relevant authorities, and will require treatment of the groundwater prior to disposal, which is typical. Ongoing monitoring of groundwater quality will be required during discharge periods to confirm compliance with the water quality acceptance criteria.

As any drawdown is predicted to be within the rock profile, the risk of subsidence in neighbouring structures due to drawdown is expected to be negligible.

From a hydrogeological viewpoint, it is considered that a drained basement is feasible without significant impacts on surrounding groundwater systems or property, and this will be subject to review and approval from DCCEEW and other relevant authorities.

It should be noted that if there are changes to surrounding basements or water levels are found to be higher than assumed, there may be an increase in groundwater inflows which should be considered for basement design.

12. References

ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australia New Zealand Environment Conservation Council.

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

Australian Government (2013). *Guidelines for Groundwater Protection in Australia – National Water Quality Management Strategy*. Department of Agriculture, Water and the Environment, Canberra.

Classification of sandstones and shales in the Sydney region: a forty-year review (2019)

Douglas. (2025 GI). Geotechnical investigation report.

Geoscience Australia. (2009). *Groundwater Sampling and Analysis - A Field Guide*. Commonwealth of Australia.

Kavvas, M., Gioles, A., & Papacharalambous, G. (1992). Drainage of Supported Excavations. *Geotechnical and Geological Engineering*, 10, 141-157.

NSW DCCEEW. (1998). *Acid Sulfate Soils Risk Map Series*. State Government of NSW and NSW Department of Climate Change, Energy, the Environment and Water 1998.

NSW DPE. (2021). *Minimum requirements for building site groundwater investigations and reporting*.

NSW DPI – Office of Water. (2012). *NSW Aquifer Interference Policy*.

NSW DPI – Water. (2013). *Aquifer Interference Policy: NSW Policy for Managing the Impacts of Groundwater Extraction*.

WaterNSW. Fact Sheet – *Construction dewatering – Information for councils and applicants*.

WaterNSW. Fact Sheet – *Construction dewatering – General terms of approval*.

13. 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 29/11/2024. 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.

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

This report must be read in conjunction with all 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

Introduction

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

DP's 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 Conditions of Engagement 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, DP 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, DP 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, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

About this Report

Site Anomalies

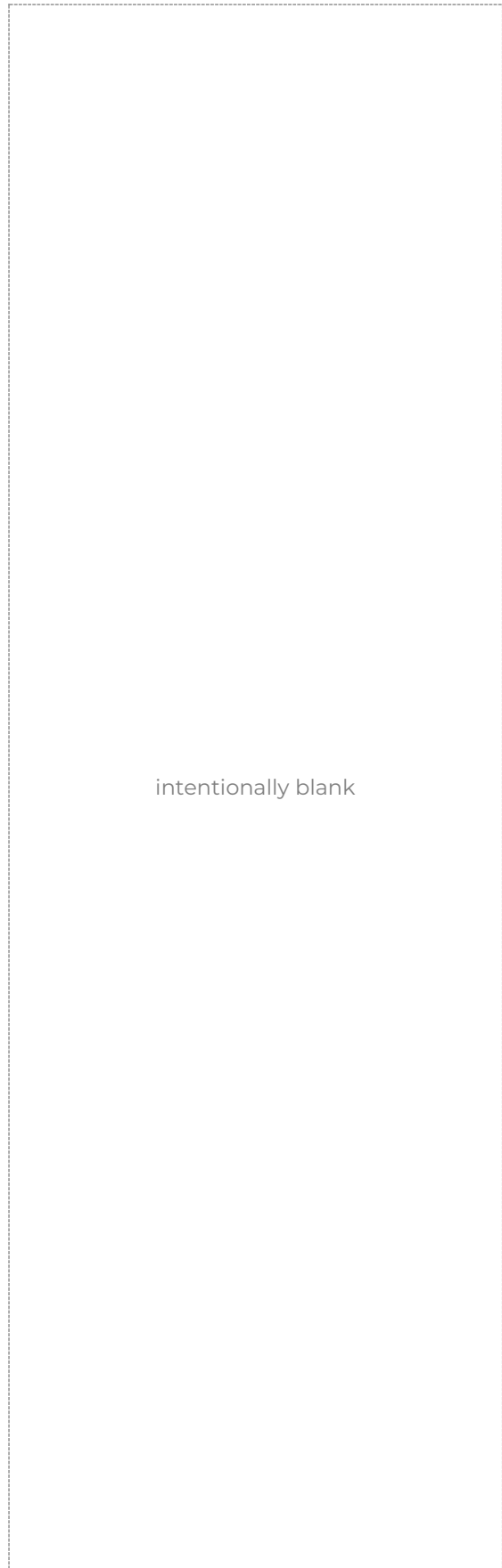
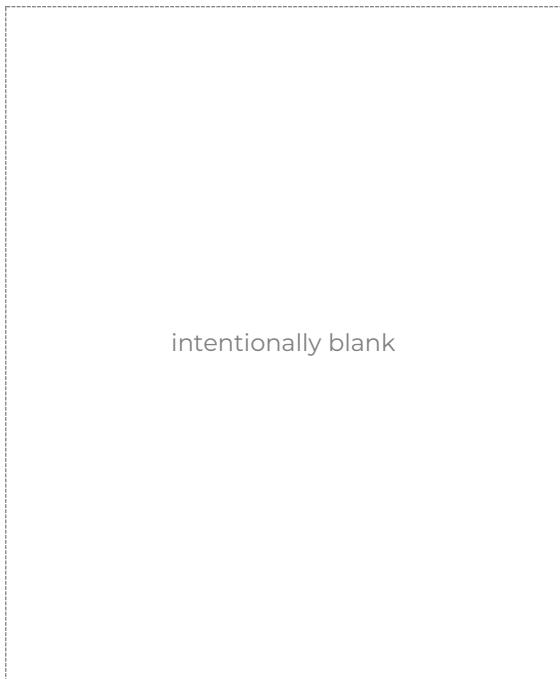
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later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



Appendix B

Drawings



LEGEND	
	Borehole
	Borehole (with Groundwater Well)
	Approximate Site Boundary
	Cross Section Line

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 / MCA zone 56

PROJECT NAME:
Proposed Mixed Use Development

PROJECT ADDRESS:
253-265 Pacific Highway, North Sydney

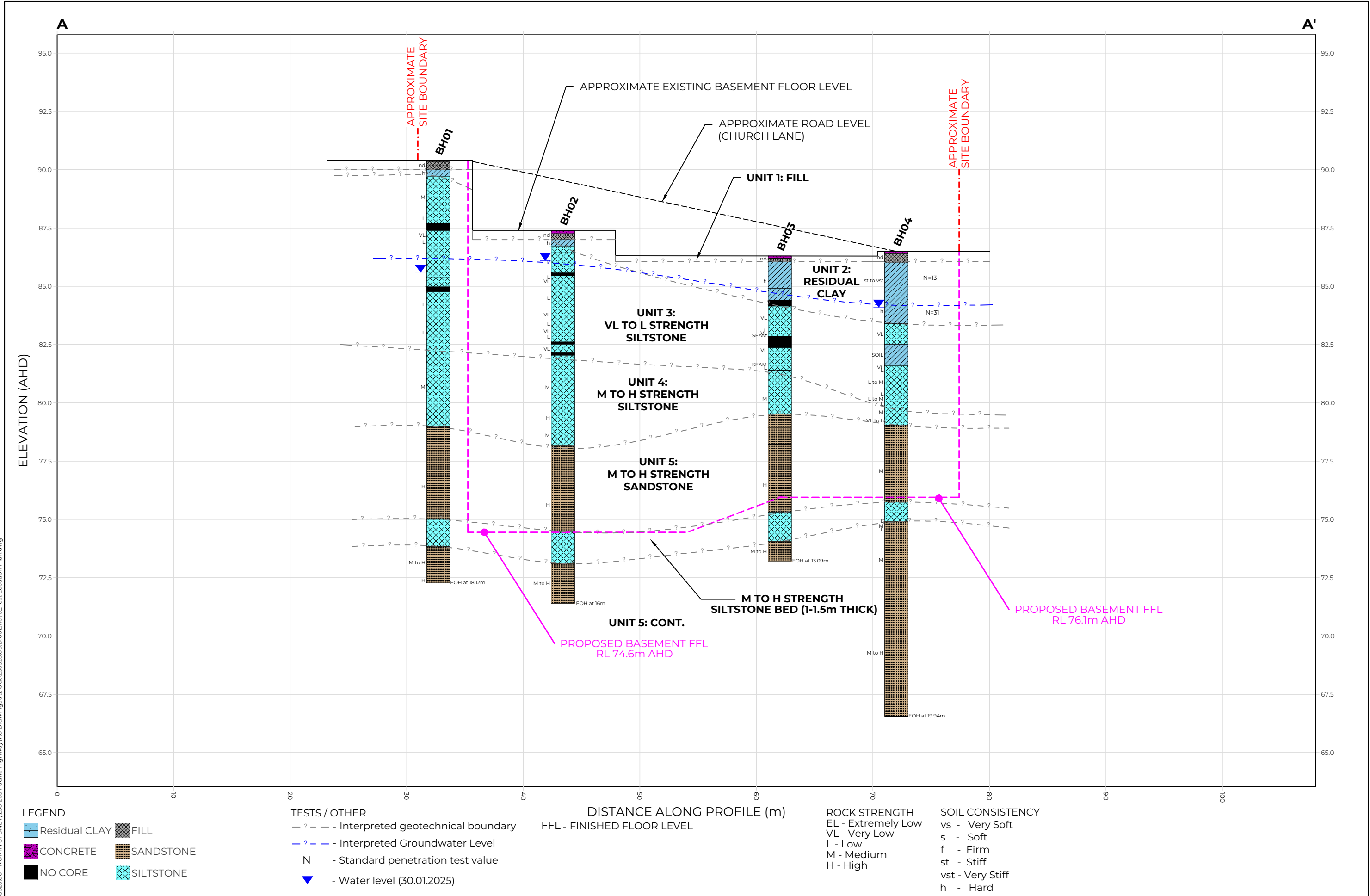
DRAWING TITLE:
Test Location Plan

PROJECT NO:
233323.00

DRAWING NO:
1

REVISION:
0

\\dps\dmas02\Projects\233323.00 - NORTH SYDNEY, 253-265 Pacific Highway\70 Drawings\7.3. QGIS\233323.00.dwg



LEGEND

TESTS / OTHER

	Interpreted geotechnical boundary
	Interpreted Groundwater Level
N	Standard penetration test value
	Water level (30.01.2025)

DISTANCE ALONG PROFILE (m)
FFL - FINISHED FLOOR LEVEL

ROCK STRENGTH	SOIL CONSISTENCY
EL - Extremely Low	vs - Very Soft
VL - Very Low	s - Soft
L - Low	f - Firm
M - Medium	st - Stiff
H - High	vst - Very Stiff
	h - Hard

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

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

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Appendix C

Borehole Logs

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						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
	0.05	CONCRETE: 50mm thick, no reo observed		FILL	ND			D	0.05				Concrete	
	0.20	FILL / SAND, with gravel: brown.		FILL		D		D	0.20					
	0.40	FILL / Gravelly SAND: dark grey; fine to medium; siltstone and sandstone gravel.						D	0.40					
	0.70	CLAY (CI-CH): pale yellow-brown; medium to high plasticity.		RS	H	w<PL		D	0.60					
	0.85	SILTSTONE: pale yellow-brown; apparently very low strength. Ashfield Shale						D	0.70					
	1	Continued as rock												
	2	From 0.60m: becoming extremely weathered siltstone with very low strength siltstone bands												
	3													
	4													
	5													
	6													
	7													
	8													
	9													

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



Generated with CORE-GS by Geoc - 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: 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

CONDITIONS ENCOUNTERED										SAMPLE			TESTING							
GROUNDWATER RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS		BACKFILL	WELL PIPE	
																PL(A)	PL(B)			
80		[CONT] SILTSTONE: dark grey; medium bedded to laminated. Ashfield Shale					100	100		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 100mm					PLT	PL(A)=0.46MPa				
	11	From 10.75m: 10-40% fine grained, pale grey sandstone laminations				M	100	100		8.12-8.31m: JT, 80-90°, PR, CN, SM 8.33m: JT, 50°, UN, CN, SM 8.38m: JT, 60°, PR, CN, SM					PLT	PL(A)=0.57MPa				
11.43		SANDSTONE: pale grey, fine to medium grained, 1-5% dark grey siltstone laminations. Hawkesbury Sandstone			11.43					8.78m: JT, 0-10°, CU, CN, SM 8.95m: JT, 50°, PR, CN, SM 9.68m: JT, 25°, PR, CN, SM					PLT	PL(A)=0.32MPa				
12										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					PLT	PL(A)=1.4MPa				
13							100	100							PLT	PL(A)=1.3MPa				
14						H	100	100		13.25m: P, PR, TI, RF					PLT	PL(A)=1.0MPa				
15										14.46m CS, fine sand and fines					PLT	PL(A)=1.2MPa				
15.40		SILTSTONE: dark grey, 5-10% fine grained, pale grey sandstone laminations; distinct bedding. Hawkesbury Sandstone					100	100							PLT	PL(A)=2.2MPa				
16															PLT	PL(A)=2.1MPa				
16.56		SANDSTONE: pale grey, medium to coarse grained, 1-10% dark grey siltstone laminations. Hawkesbury Sandstone			16.56										PLT	PL(A)=0.77MPa				
17						M	100	100							PLT	PL(A)=0.88MPa				
18					17.93	H									PLT	PL(A)=1.5MPa				
	18.12	Borehole discontinued at 18.12m depth. Target depth reached.																		

NOTES: #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



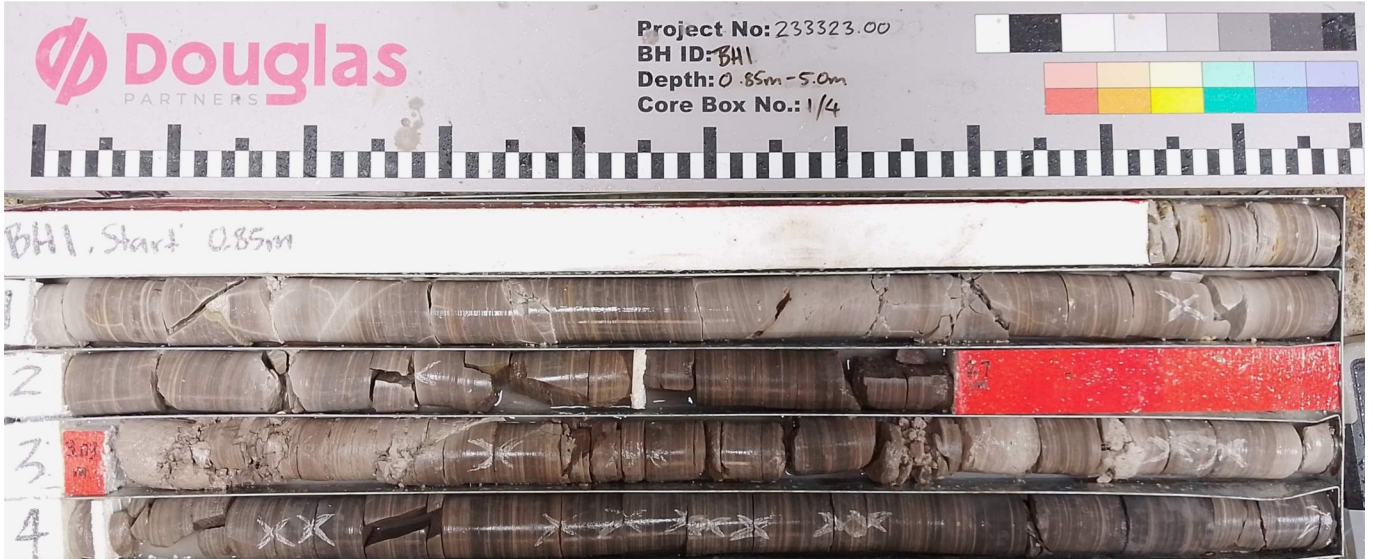
Generated with CORE-GS by Ceroc - Split Soil-Rock Log

CORE PHOTO LOG

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

SURFACE LEVEL: 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 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

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

GROUNDWATER		CONDITIONS ENCOUNTERED					SAMPLE			TESTING AND REMARKS						
		RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. (°)	DENSITY (°)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL
	87	0.15	CONCRETE: 150mm thick; SL62 at 70mm depth		FILL	ND		ND				0.15	IDCP9/150		Flush cover	
	87	0.40	FILL / Sandy GRAVEL: grey; fine to coarse, igneous; trace fines.		RS	H		W		D		0.40				
	87	0.70	CLAY (CI-CH), with gravel: grey; medium to high plasticity; siltstone gravel.					w=PL		D		0.70				
	86	0.93	SILTSTONE: grey; apparently very low strength									1				
	86		Continued as rock									2				
	85	2	0.60m: increased drill resistance; becoming extremely weathered siltstone with highly weathered; very low strength siltstone									2				
	84	3										3				
	83	4										4				
	82	5										5				
	81	6										6				
	80	7										7				
	79	8										8				
	78	9										9				

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



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

CONDITIONS ENCOUNTERED										SAMPLE			TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
RL (m)				LRS LXW LHW LWV LWU LWY LWZ LWR		VL L M H VH EH												
87.4	0.40	Continued from soil												0.40				
86.5	1.00	SILTSTONE: dark grey; 0-5% fine grained, pale grey sandstone laminations. Ashfield Shale	MW		0.93	L	100	94		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			1.00	PLT	PL(A)=0.27MPa			
85.5	1.83		MW		1.83	L							1.83	PLT	PL(A)=0.16MPa			
85.0	1.96		HW		1.96	VL							1.96					
84.5	2.07		HW		2.07	VL				2.07m: EW, Clay 10mm 2.11m: JT, 70°, UN, CN, SM 2.16-2.19m: EW, Clay 30mm			2.07	PLT	PL(A)=0.14MPa			
84.0	2.30		MW		2.30	L	92	65		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			2.30	PLT	PL(A)=0.14MPa			
83.5	3.50		HW		3.50	VL				2.39m: JT, 70°, PR, CN, SM 2.85m: JT, 70°, PR, CN, SM			3.50					
83.0	3.75		MW		3.75	L	92	68		3.21-3.31m: B x 2, 0°, PR, Fe, SM 3.43-3.53m: JT, 60-90°, CU, CN, SM 3.59m: JT, 85°, UN, CN, SM			3.75	PLT	PL(A)=0.11MPa			
82.5	4.30		HW		4.30	VL				3.70m: B, 0°, UN, CN, SM 3.73m: B, 0-10°, ST, CN, SM			4.30	PLT	PL(A)=0.12MPa			
82.0	4.79		MW		4.79	L				4.32m: JT, 30°, PR, CN, SM 4.40m: JT, 20°, PR, CN, SM			4.79	PLT	PL(A)=0.12MPa			
81.5	4.90		HW		4.90	VL				4.76m: JT, 70°, UN, CN, SM 5.05m: JT, 45°, PR, CN, SM			4.90					
81.0	5.26		XW		5.26	SEAM	87	0		5.22-5.26m: CS, 30mm 5.36-5.46m: CS, SN Fe 100mm			5.26					
80.5	5.36				5.36					5.55m: JT, 45°, PR, CN, SM 5.60m: JT, 45°, UN, CN, SM			5.36	PLT	PL(A)=0.93MPa			
80.0	5.46				5.46					6.12m: JT, 45°, PR, CN, SM			5.46	PLT	PL(A)=0.81MPa			
79.5	7.80		FR		7.80	M	100	100		7.45m: JT, 0-20°, CU, CN, SM 7.78-7.88m: JT, 60°, PR, CN, SM			7.80	PLT	PL(A)=0.97MPa			
79.0	8.27	8.36m-8.70m: 10-30% fine grained, pale grey sandstone laminations	XW		8.27	H	100	98		8.27-8.33m: CS, 60mm			8.27	PLT	PL(A)=1.2MPa			
78.5	8.33				8.33					8.36m: JT, 0-20°, CU, CN, SM			8.33	PLT	PL(A)=0.58MPa			
78.0	8.70	SILTSTONE AND SANDSTONE: 70% dark grey siltstone; 30% fine grained, pale grey sandstone. Ashfield Shale	FR		8.70	M				9.08m: JT, 30°, UN, CN, SM 9.19m: B, 5°, UN, CN, SM			8.70	PLT	PL(A)=0.56MPa PL(A)=0.43MPa			
77.5	9.25				9.25	H	100	100					9.25	PLT	PL(A)=2.5MPa			

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

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



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

CONDITIONS ENCOUNTERED										SAMPLE			TESTING								
GROUNDWATER RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH		RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				LS	DW	HW		SH	FR												
77	11	SANDSTONE: pale grey, fine to coarse grained, 5-30% dark grey siltstone laminations and beds. Hawkesbury Sandstone								100	100						11	PLT	PL(A)=1.6MPa		
76	12									100	100						12	PLT	PL(A)=1.2MPa		
75	12.92									100	100		12.92m: B, 0°, PR, CN, SM				13	PLT	PL(A)=1.3MPa		
74	14	SILTSTONE AND SANDSTONE: 80% dark grey siltstone; 20% fine grained, pale grey sandstone. Hawkesbury Sandstone								100	100						14	PLT	PL(A)=1.1MPa		
73	14.29									100	100		14.29m: B, 15°, PR, CT Clay 3mm, RF				14				
72	15	SANDSTONE: pale grey, medium to coarse grained, 1-5% dark grey siltstone laminations. Hawkesbury Sandstone								100	100						15	PLT	PL(A)=0.94MPa		
71	16	Borehole discontinued at 16.00m depth. Target depth reached.															16	PLT	PL(A)=0.95MPa		
71	17																				
70	18																				
69	19																				
68																					

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

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



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



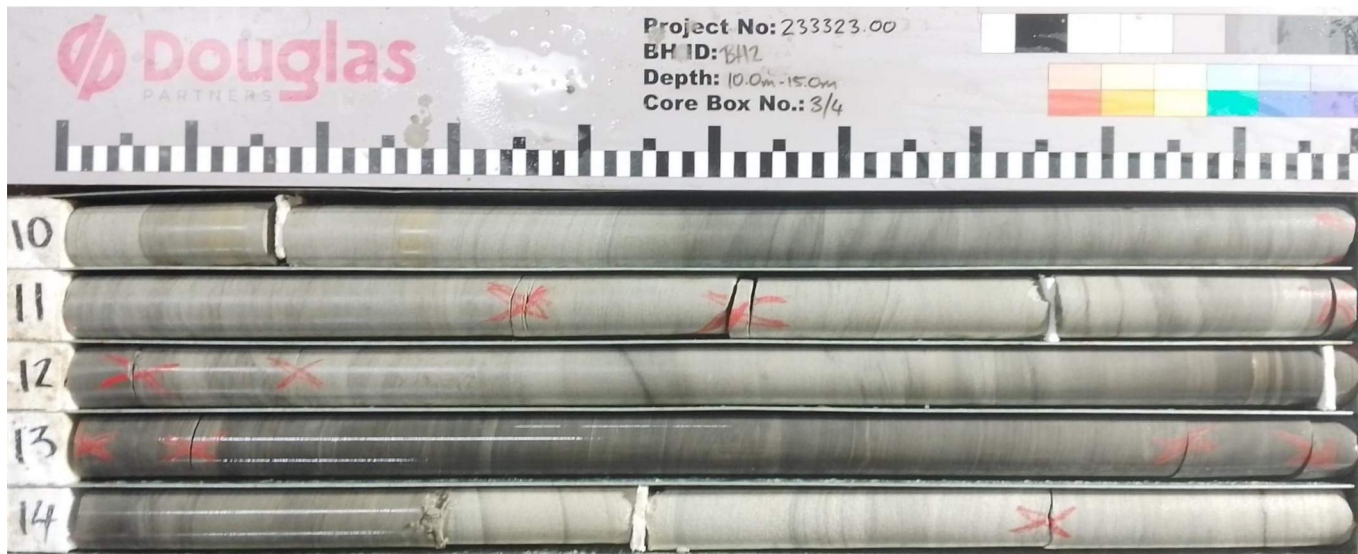
5.00-10.00 m depth

CORE PHOTO LOG

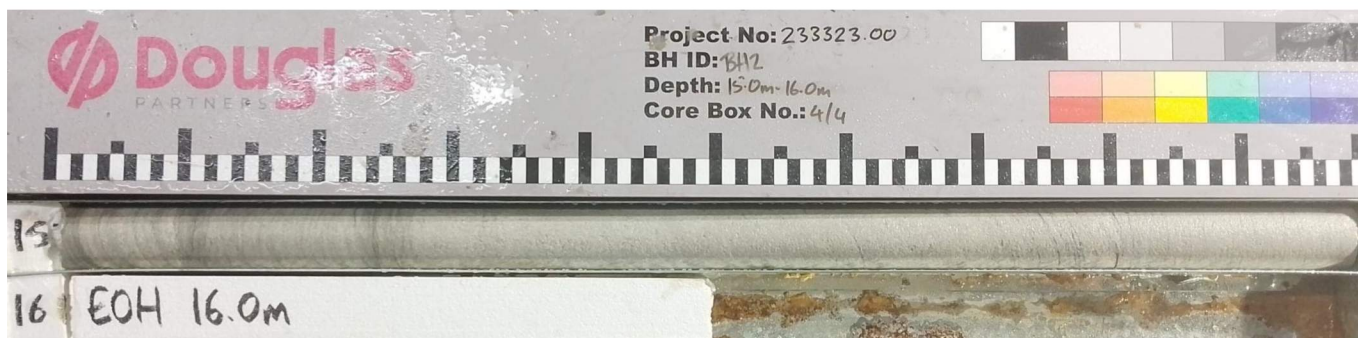
CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

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					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				
86.3	0.10	CONCRETE: 100mm thick, no reo observed		FILL	ND	ND		D	0.10 - 0.25	0.10						
	0.25	FILL / Gravelly CLAY, with sand: grey; medium to high plasticity; medium to coarse, igneous gravel.				w>PL				0.25						
		CLAY (CI-CH): grey; medium to high plasticity.		RS		H		D	0.80 - 0.90	0.80						
	1.40	CLAY: grey; medium plasticity; with pockets of highly weathered siltstone.		XWM		w<PL		D	1.40 - 1.50	1.40						
84.0	1.90	Continued as rock						D	1.80 - 1.90	1.80						
83.0	3.00									3.00						
82.0	4.00									4.00						
81.0	5.00									5.00						
80.0	6.00									6.00						
79.0	7.00									7.00						
78.0	8.00									8.00						
77.0	9.00									9.00						

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: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE			TESTING					
												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																	
	11.00		SANDSTONE AND SILTSTONE: 80% dark grey siltstone and 20% fine grained pale grey sandstone. Hawkesbury Sandstone		FR		H	100	100		11.00m: B, 0°, PR, CN, SM					11	PLT	PL(A)=2.1MPa		
	12										11.73m: B, 0°, PR, CN, SM									
	12.25		SANDSTONE: pale grey, fine to medium grained, 1-5% siltstone laminations. Hawkesbury Sandstone			12.25	H	100	100		12.25m: B, 0°, PR, CN, RF					12	PLT	PL(A)=2.6MPa		
	13																			
	13.09		Borehole discontinued at 13.09m depth. Target depth reached.																	
	73																			
	74																			
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NOTES: #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



Generated with CORE-GS by Ceroc - 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: 1 of 2



1.90-6.00 m depth



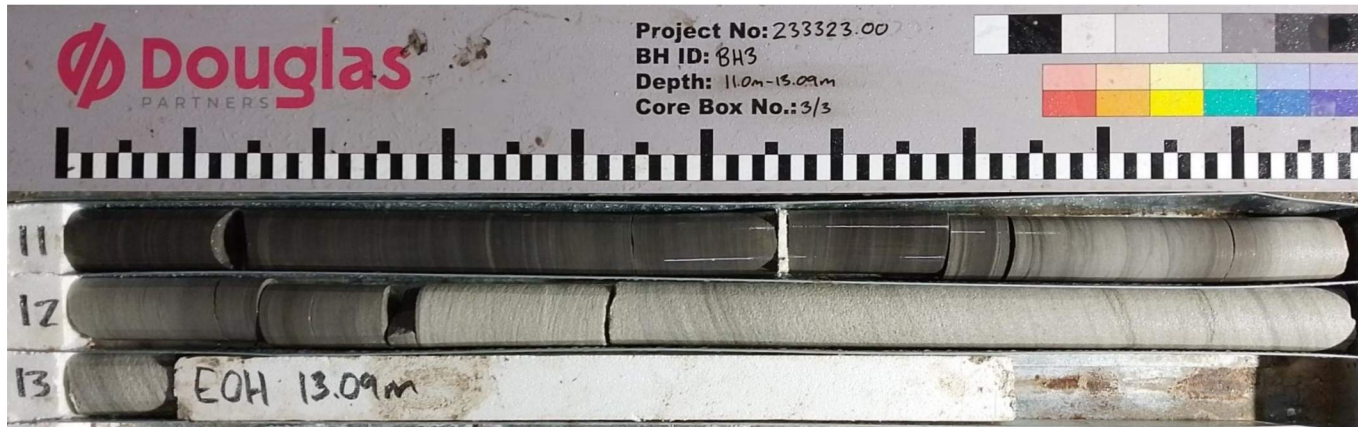
6.00-11.00 m depth

CORE PHOTO LOG

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

SURFACE LEVEL: 86.3 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	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. (°)	DENSITY (g/cm³)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
RL (m)	0.10	CONCRETE: 100mm thick; no reo observed							D	0.10 - 0.20					
	0.50	FILL / Gravelly CLAY: grey ; medium plasticity; with brick fragments.		FILL	ND		ND		D	0.40 - 0.50					
	1.00	CLAY (CI-CH): pale grey; medium to high plasticity.													
	2.00	From 2.00m: grey and dark brown, increased drilling resistance							SPT	1.00 - 1.45		SPT	3,6,7 N=13 400-500kPa		
	2.50	CLAY (CL-CI): pale grey; low to medium plasticity; friable, extremely weathered material.													
	3.10	Continued as rock		XWM	H				SPT	2.50 - 2.95		SPT	6,13,18 N=31 friable >600kPa		
	4.00														
	5.00														
	6.00														
	7.00														
	8.00														
	9.00														

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

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.

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

CONDITIONS ENCOUNTERED										SAMPLE			TESTING						
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
	76	[CONT] SANDSTONE: pale grey, fine to medium grained, medium bedded. Hawkesbury Sandstone					100	100							PLT	PL(A)=0.69MPa			
	10.76	SILTSTONE: dark grey, with 10% fine grained interlaminated sandstone. Hawkesbury Sandstone		SW		M								11	PLT	PL(A)=1.8MPa			
	11.60	SANDSTONE: pale grey, medium grained, with discontinuous cross-bedding at 10-15°. Hawkesbury Sandstone			11.48	L	100	90		11.49-11.60m: B x9, 0°, PR, CT Clay									
	11.89		M			11.66m: DS, Clay 25mm													
	12		L			11.87-11.96m: CS, 90mm													
	13					M								13	PLT	PL(A)=0.68MPa			
	14						100	97		13.56m: B, 10°, UN, CT Clay, RF				14	PLT	PL(A)=0.80MPa			
	15									13.92m: B, 0°, UN, CN, RF									
	16			FR			100	100		14.79m: B, 5°, PR, CN, RF				15	PLT	PL(A)=0.99MPa			
	17									14.85m: B, 5°, PR, CN, RF									
	18													16	PLT	PL(A)=1.0MPa			
	19									16.22m: B, 5°, PR, CT Clay, RF									
	19.94	Borehole discontinued at 19.94m depth. Target depth reached.					100	100						17	PLT	PL(A)=1.0MPa			
														18	PLT	PL(A)=1.2MPa			
														19	PLT	PL(A)=1.1MPa			
														19	PLT	PL(A)=1.1MPa			

NOTES: #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

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

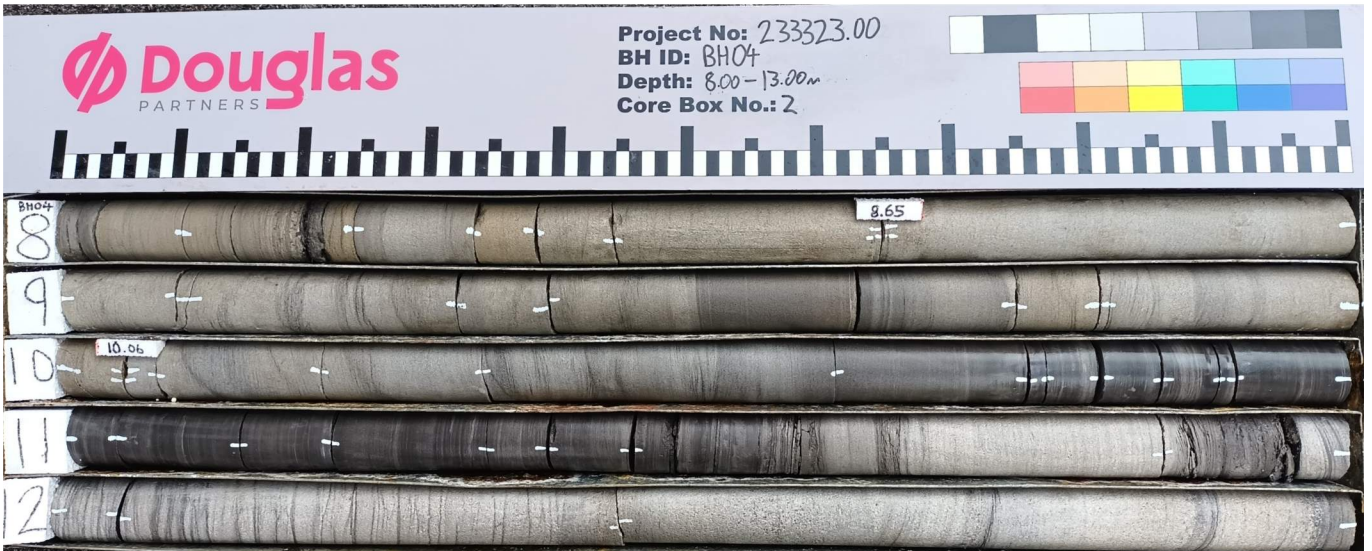
CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 253-265 Pacific Highway, North Sydney, NSW

SURFACE LEVEL: 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

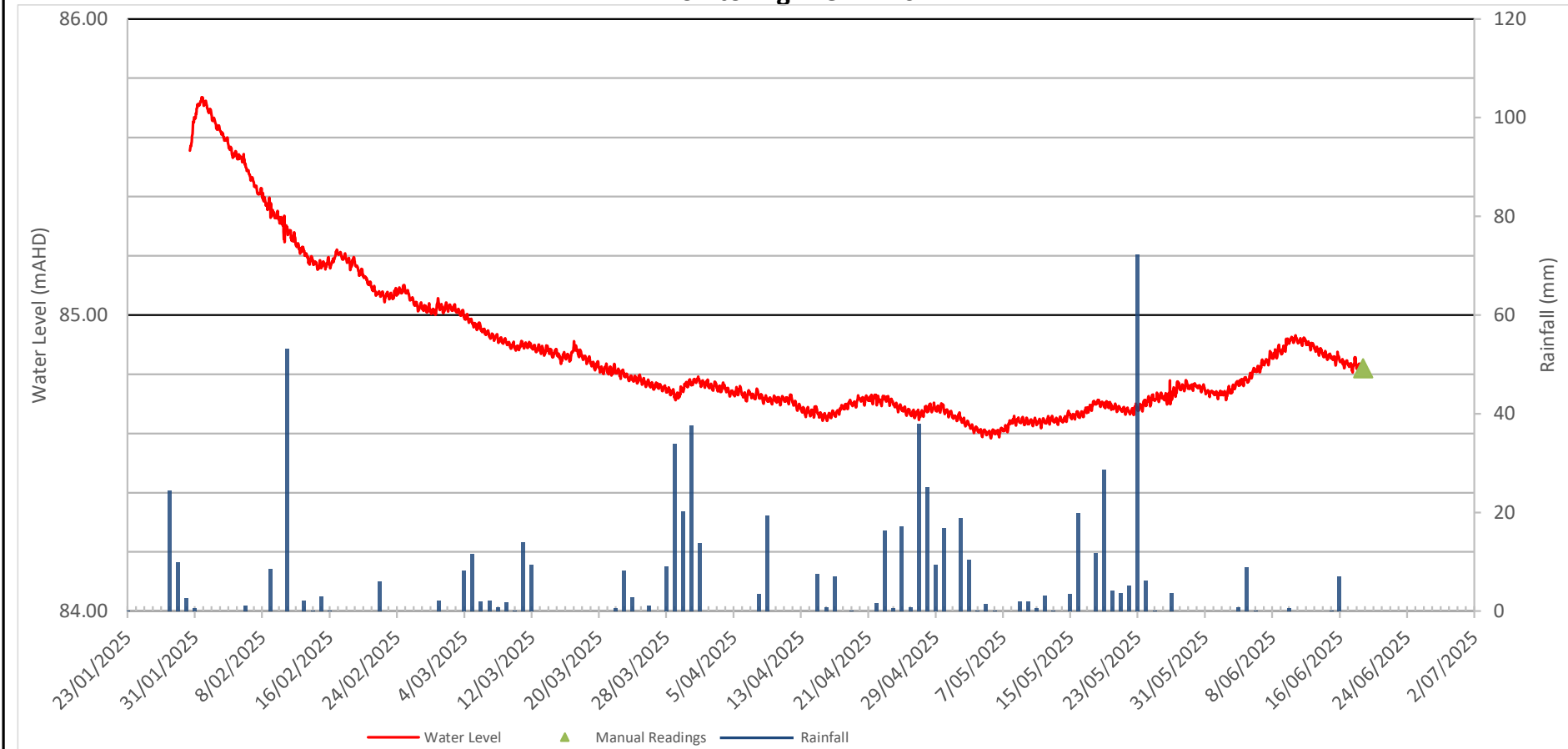


18.00-19.94 m depth

Appendix D

Hydrographs

Monitoring Well: BH01



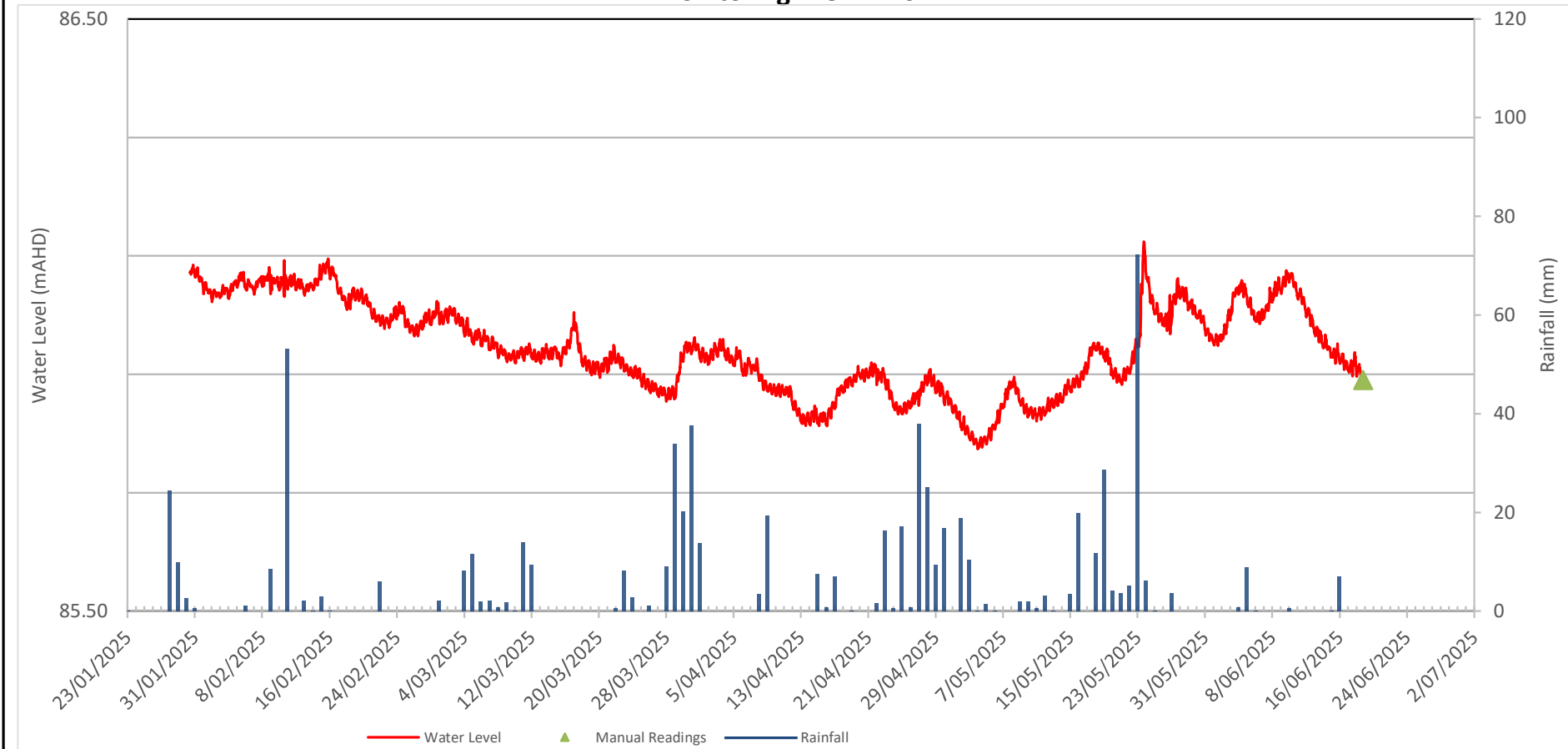
Note: Reading Interval = 60 minutes



From
30/01/2025
To
18/06/2025

Drawn:
RM
Date:
19/06/2025

Monitoring Well: BH02



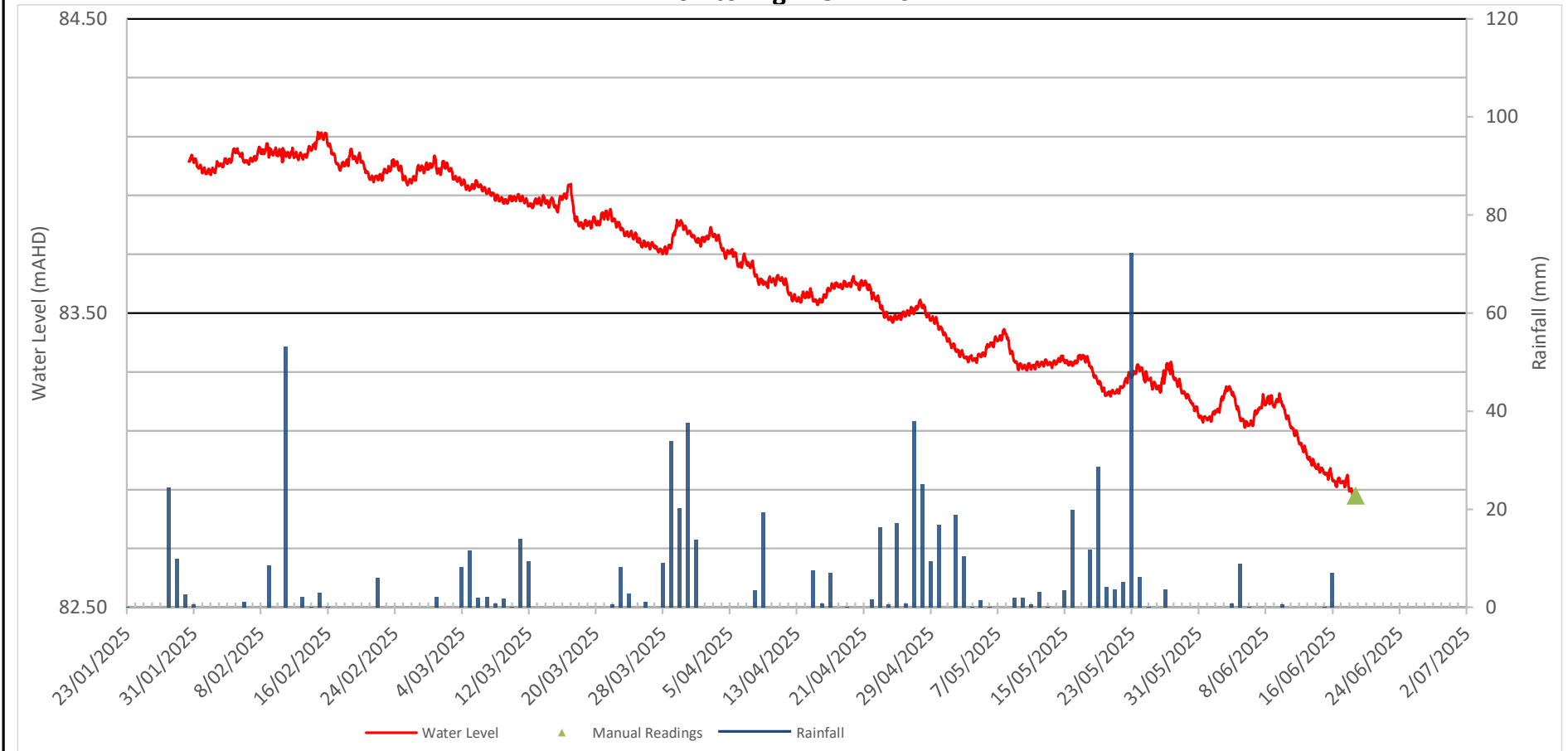
Note: Reading Interval = 60 minutes



From
30/01/2025
To
18/06/2025

Drawn:
RM
Date:
19/06/2025

Monitoring Well: BH04



Note: Reading Interval = 60 minutes



From
30/01/2025
To
18/06/2025

Drawn:
RM
Date:
19/06/2025

Appendix E

Hydraulic Testing Results

Appendix F

Groundwater Laboratory Testing Results



	Chlorinated Benzenes								Trihalomethanes				Herbicides & Fungicides		Phthalates				Nitrobenzenes		Nitrotoluenes	Anilines		Organic Sulfur Compounds	Chlorinated Hydrocarbons			
	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Pentachlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Nitrobenzene	Pentachlorocyclopentadiene	2,4-dinitrotoluene	2-Nitroaniline	Aniline	Carbon disulfide	Hexachlorocyclopentadiene	Heachlorobutadiene
EQL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ADWG (2011) Aesthetic - Updated March-2021	0.005	0.005	0.005	0.001	0.005	0.001	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.005	0.005	
ADWG (2011) Health x 10 (Recreational) - Updated March-2021	-	-	-	0.001	-	0.02	0.0003	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 80% toxicant DGVs	-	0.009	0.24	-	0.03	-	-	0.19	0.005	-	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 90% toxicant DGVs	-	0.007	0.14	-	0.02	-	-	0.1	0.0025	-	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 95% toxicant DGVs	-	0.005	0.08	-	0.013	-	-	0.055	0.002	-	0.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
ANZG (2018) Marine water 99% toxicant DGVs	-	0.003	0.02	-	0.008	-	-	0.015	0.0015	-	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NEPM 2013 Table 1A(4) Res HSL A/B GW for Vapour Intrusion, Sand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sydney Water Trade Waste Acceptance Criteria (Industrial 2024-2025 Standards)	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Field ID	Matrix Type	Date	Lab Report Number	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Pentachlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Nitrobenzene	Pentachlorocyclopentadiene	2,4-dinitrotoluene	2-Nitroaniline	Aniline	Carbon disulfide	Hexachlorocyclopentadiene	Heachlorobutadiene
BH01	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	0.001	0.044	<0.001	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH02	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH04	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA01	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RINSATE	Water	28 Jan 2025	1181514	<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TB	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TS	Water	28 Jan 2025	1181514	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	0.000	0.009	<0.001	0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH02	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BH04	Water	Five times dilution factor		<0.005	<0.005	<0.005	<0.001	<0.005	<0.001	<0.001	<0.001	<0.005	<0.001	<0.005	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
RPD	Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Environmental Standards
 ANZG, 2018, ANZG (2018) Marine water 80% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 90% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 95% toxicant DGVs
 ANZG, 2018, ANZG (2018) Marine water 99% toxicant DGVs