Douglas PARTNERS

GROUNDED EXPERTISE

# Report on Groundwater Impact Assessment

## Proposed Mixed-Use Hotel Development

## 153-157 Walker Street, North Sydney NSW

## Prepared for Freecity Group Holdings Pty Ltd

## Project 233796.00

## 1 September 2025

# Document History

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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 Hotel Development
# 153-157 Walker Street, North Sydney NSW

## 1. Introduction

This groundwater impact assessment (GIA) has been prepared by Douglas Partners Pty Ltd (Douglas) to accompany a State Significant Development Application (SSDA) at 153-157 Walker Street, North Sydney NSW (the site). The assessment was commissioned by Simon Liang of Freecity Group Holdings Pty Ltd and was undertaken in accordance with Douglas' proposals 233796.00.P.001.Rev1 and 233796.00.P.002.Rev0 dated 21 January and 19 June 2025, respectively.

It is understood that this GIA report is to be submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf of Freecity Group Holdings Pty Ltd (Freecity) to support the State Significant Development Application (SSDA) SSD-82599709, for a mixed-use hotel development at 153 - 157 Walker Street, North Sydney (the site).

The proposed development includes:

- Site preparation, including ground excavation and the demolition of existing structures at the site.
- Construction of a new fifty-one (51) storey mixed-use tower, which will accommodate:
  - Residential apartments, including a build-to-rent housing component.
  - Nine (9) affordable housing apartments equating to 3% of the total dwellings proposed.
  - A hotel that will be operated by one entity with a central management structure.
  - Ancillary lounge and wellness facilities.
  - Retail floorspace at ground level.
- Eleven (11) basement levels with car parking facilities and plant rooms to service the proposed development.
- One (1) loading zone at the Lower Ground Level;
- Vehicle access from Little Walker Street; and
- Associated building plant, utilities and service connections.

Further reference should be made to the detailed description of the proposed development within the Environmental Impact Assessment (EIS) that has been prepared by Urbis Ltd (Urbis).

This assessment utilises data from the geotechnical investigation report (Ref. 233796.00.R.001.Rev3) (Douglas, 2025), based on investigations originally undertaken in 2022 and more recently in August 2025 which comprised five geotechnical boreholes (BH01, BH02, BH03a, BH04 and BH201). Within four of the boreholes (BH01, BH03a, BH04 and BH201), groundwater monitoring wells were installed. The results of the investigations are referenced in this GIA Report.

# 2. Environmental Setting

## 2.1 Geology

Reference to the Sydney 1:100 000 Series Geological Sheet indicates that the site is underlain by Hawkesbury Sandstone which typically comprises medium to coarse grained quartz sandstone with some shale bands or lenses.

Within the Sydney area the most common defects within the Hawkesbury Sandstone are widely spaced horizontal bedding planes, typically spaced at 1 m to 3 m, and two orthogonal sets of steeply dipping joints. Such joints typically have dips of 75 to 90 degrees from horizontal (i.e. close to vertical) and are oriented with strikes just east of north (about 10 degrees) and just south of east (about 110 degrees). Apart from these main defect sets there are likely to be other less common joints or faults with moderate dips of 20 to 30 degrees and 40 to 60 degrees.

## 2.2 Hydrogeological Conditions

The site is within the Sydney Basin Central Groundwater source which is defined by the Water Sharing Plan for the Greater Metropolitan Region Groundwater Source as follows:

*"The water source is bounded by the main arm of the Hawkesbury River to the north and the Nepean River to the west and south covering an area of 3,831.4 km$^2$. The Sydney Basin Central Groundwater Source is, for the most part, topographically low-lying within a broad structural depression. It is predominantly capped by low permeability shale units of the Wianamatta Group. The area receives relatively less rainfall compared to water sources in the west. The land use over the groundwater source is predominantly urban. Bores are evenly distributed across the area. Average bore depth and average yield are about 50 m and 1.6 L/s respectively. The targeted aquifer for water supply is sandstone which is interbedded with shales. Median water level of bores at the time of construction is 29 mbgl."* (NSW DPIE, 2023)

Water can be encountered within hills as confined aquifers or perched water tables but, also as seepage through fractures and the general rock mass which may be sourced from rainfall infiltration and leaking services. Water can flow in a stepped manner through fractures and zones of higher permeability within the rock to form perched aquifers overlying a lower regional water table.

## 2.3 Groundwater Dependant Ecosystems (GDE) and Contaminated Sites

There are no identified groundwater dependent ecosystems (GDE) within 2 km of the site. The nearest identified terrestrial GDE is located within Flat Rock Creek, approximately 2.35 km north and outside the influence of the site.

A search of the NSW Environmental Protection Agency (NSW EPA) online contaminated land register indicated there are no registered sites within 1 km of the site that may impact, or be impacted by, the development of the site.

## 2.4 Registered Groundwater Bores

A search of the publicly available registered groundwater bore database indicated that there are two registered groundwater bores within 500 m of the site. Details of the registered monitoring

bores are summarised in Table 1. It should be noted that these bores are located downslope of the site between around RL 4 AHD and 2 AHD and are not relevant to the project.

**Table 1: Summary of available information from nearby registered groundwater bores**

| Bore ID<br>Authorised Purpose | Location | Final depth (m) | Standing water level (m bgl) |
|---|---|---|---|
| GW105413<br>Monitoring bore | 498 m south-east of site | 3.5 | 1.38 |
| GW105414<br>Monitoring bore | 500 m south-east of site | 3.5 | 1.36 |

### 2.5 Climate and Rainfall

The east coast of the Sydney region is classified as warm temperate (ABCB, 2025) and experiences fully humid precipitation, uniform rainfall and warm summers (Kottek, et al., 2006).

Daily rainfall data was obtained from an Australian Bureau of Meteorology registered weather station at the Sydney Botanical Gardens (Station 66006, opened 1885). A summary of the information is provided in Figure 4 and Table 11, both attached in Appendix A. The data indicates there have recently been relatively 'wet' periods where monthly rainfall was generally above average levels.

### 2.6 Acid sulfate soil

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.

## 3. Douglas Site Investigation Data

### 3.1 Geology

Based on the geotechnical investigation, the site (below the existing basement slab) is generally underlain by thin layers of fill (less than 0.5 m) and residual soils which combined are generally less than 1 m deep and overlying sandstone bedrock. It should be noted that deeper fill and residual soil depths may be present beyond the boundaries of the existing basements (i.e. from street level to the existing basement level). The sandstone bedrock strength generally increase with depth from very low to medium to high.

The results of the investigation at the borehole locations are consistent with geological mapping and Douglas experience from investigations at nearby sites within the North Sydney CBD.

### 3.2 Groundwater Monitoring

Groundwater levels have been measured from each of the three wells (BH01, BH03A and BH04) previously installed on site by Douglas as part of the site geotechnical investigation in 2022. A manual reading was undertaken in November 2022, with subsequent readings taken in March and August 2025. An additional well (BH201) was installed more recently in August 2025 with a manual reading soon after the installation. Details of the well construction and measured water levels are in Table 2.

A data logger has been set-up in each of the wells for continuous hourly monitoring of groundwater levels. Monitoring wells within boreholes BH01, BH03a and BH04 have monitored groundwater levels for a period of at least 3 months since February 2025. A summary of the results is presented in Table 3 and Figure 4 (Appendix A), which indicates relatively consistent levels at the site.

**Table 2: Summary of groundwater well details and manual readings**

| Borehole | Ground Level (m AHD) | Screen Depth (m) [RL m AHD] | Screened Material | Manual Groundwater Readings | |
|---|---|---|---|---|---|
| | | | | Measured water level m BGL [RL m AHD] | Date |
| **BH01** | 50.5 | 1.0 – 16.0 [49.5 – 34.5] | Sandstone | 6.3 [44.2]<br>6.65 [43.85]<br>6.58 [43.92] | 30/11/2022<br>04/03/2025<br>21/08/2025 |
| **BH03A** | 55.8 | 6.5 – 22.0 [49.3 – 33.8] | Sandstone | 11.0 [44.8]<br>10.95 [44.85]<br>10.83 [44.97] | 30/11/2022<br>04/03/2025<br>21/08/2025 |
| **BH04** | 55.8 | 7.5 – 21.9 [48.3 – 33.9] | Sandstone | 8.0 [47.8]<br>7.75 [48.05]<br>7.58 [48.22] | 30/11/2022<br>04/03/2025<br>21/08/2025 |
| **BH201** | 56.3 | 21.0 – 39 [35.0 – 17.3] | Sandstone | 22.58 [33.72] | 21/08/2025 |

Notes: Water levels measured below ground level (BGL) using a dip tape.

**Table 3: Summary of groundwater levels from continuous monitoring**

| Borehole | Depth to groundwater, m bgl (RL AHD) | | | | Variation* (m) |
|---|---|---|---|---|---|
| | Lowest | Median | Average | Highest | |
| **BH01** | 6.8 (43.7) | 6.64 (43.86) | 6.65 (43.85) | 6.3 (44.2) | 0.5 |
| **BH03a** | 11.07 (44.73) | 10.9 (44.9) | 10.89 (44.91) | 10.17 (45.63) | 0.9 |
| **BH04** | 8 (47.93) | 7.7 (48.1) | 7.69 (48.11) | 6.97 (48.83) | 1.03 |
| **BH201** | 22.58 (33.72) | 22.58 (33.72) | 22.58 (33.72) | 22.58 (33.72) | - |

Notes: The groundwater level variation is taken as the difference between the highest and lowest water level recorded by Douglas at the site.

The monitoring results presented in Table 3 indicate a possible stratified groundwater system within sandstone bedrock underlying the site. Monitoring wells BH01, BH03a and BH04 have captured seepage from a shallow 'perched' groundwater table within the sandstone bedrock, whilst the groundwater level in BH202 appeared to represent an intermediate to deep groundwater table.

Based on measured groundwater levels and regional topography, the groundwater flow direction is inferred to be moving in a south-easterly direction. It should be noted that groundwater levels are affected by climatic conditions and rock permeability and will therefore vary with time.

## 3.3 Permeability Testing

Rising head permeability testing was undertaken in monitoring wells BH01, BH03A and BH04, while packer testing was carried out in BH201 to evaluate the mass hydraulic conductivity (or permeability) of the sandstone material.

### 3.3.1 Rising Head Tests

The rising head test involves removing water from the well and measuring the corresponding rise in water level at regular time intervals. The results of the permeability tests are interpreted using the methods proposed by Hvorslev (1951) to determine a hydraulic conductivity (k) value. The results of the testing is summarised in Table 4, with well construction details provided in the respective borehole logs attached in Appendix B.

**Table 4: Summary of rising head tests**

| Borehole | Screen Depth (m) [RL m AHD] | Screened Material | Date | Hydraulic Conductivity, k (m/s) |
|---|---|---|---|---|
| **BH01** | 1.0 – 16.0 [49.5 – 34.5] | Sandstone | Not Accessible | - |
| **BH03a** | 6.5 – 22.0 [49.3 – 33.8] | Sandstone | 14 / 02 / 2025<br>19 / 02 / 2025 | $4.10 \times 10^{-8}$<br>$3.88 \times 10^{-8}$ |
| **BH04** | 7.5 – 21.9 [48.3 – 33.9] | Sandstone | 19 / 02 / 2025 | $3.41 \times 10^{-8}$ |
| **BH201** | 21.0 – 39 [35.0 – 17.3] | Sandstone | 19 / 08 / 2025 | $3.92 \times 10^{-8}$ |
| | | | **Geometric Mean** | **$3.8 \times 10^{-8}$** |

### 3.3.2 Packer Tests

Wireline permeability (Packer) testing is a method of calculating the permeability and hydraulic conductivity of bedrock formations surrounding a drilled borehole. A rubber packer is inflated using high pressures against the borehole walls creating a watertight seal and isolates sections of the borehole. Water is then injected under pressure directly into the area of interest. During the test, water is injected over three equally stepped increasing pressures, followed by stepping

back down over the same pressures. At each pressure step, the corresponding flow rates are recorded and plotted.

A lugeon value is then calculated based on how the bedrock behaves under the various pressures and is then converted into a hydraulic conductivity (k) (m/s).

The results of the packer testing are summarised in Table 5.

**Table 5: Summary of Packer Test Results**

| Borehole | Packer Test Depth Interval (m) [RL m AHD] | Houlsby Lugeon Value | Estimated Hydraulic Conductivity, k (m/s) |
|---|---|---|---|
| BH201 | 6.0 – 12.0 [50.3 – 44.1] | 0.8 | $1.00 \times 10^{7}$ |
| | 12.2 – 18.2 [44.1 – 38.1] | 0.1 | $1.45 \times 10^{8}$ |
| | 18 – 23.65 [38.3 – 32.65] | 0.2 | $2.30 \times 10^{-8}$ |
| | 23.65 – 30.28 [32.65 – 26.02] | 0.2 | $2.11 \times 10^{-8}$ |
| | | **Geometric Mean** | **$2.9 \times 10^{-8}$** |

The results of the testing are consistent with expectations for permeabilities of the slightly weathered and fresh, medium to high strength sandstone profile encountered at borehole test locations.

# 4. Groundwater Quality

## 4.1 Site Assessment Criteria (SAC)

Groundwater quality is assessed against the marine water default value guidelines (DVGs) presented in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018). In accordance with the site DSI report (Douglas, 2025b), it is considered appropriate to adopt marine water DVGSs and using the 99% level of species protection (LOP) for bioaccumulative contaminants and a 95% LOP for non-bioaccumulative contaminants.

The PFAS National Environmental Management Plan (NEMP) criteria (HEPA, 2020) was used as a guideline for PFAS. The PFAS NEMP provides guidelines criterion for the protection of aquatic ecosystems (ecological water quality). In accordance with the site DSI report (Douglas, 2025b), it is considered appropriate to adopt SAC applicable to a 99% LOP for potential bioaccumulation.

The adopted guideline values from the DSI report (Douglas, 2025b) is presented in Appendix C.

## 4.2 Groundwater Quality Assessment

Groundwater sampling and quality testing were undertaken as part of the DSI report (Douglas, 2025b), utilising the geotechnical wells installed at locations BH01, BH03A and BH04.

Each well was developed after installation by purging the wells of stored water until they were dry. Field parameters were continuously measured on water collected from the wells, using low-flow micro-purging methods, with samples being collected once field parameters stabilised. The results of the stabilised field parameters (prior to sampling) are presented in Table 6.

**Table 6: Summary of field parameters (groundwater and surface water)**

| Well / Sample ID | Temperature (°C) | Dissolved Oxygen (mg/L) | Turbidity (ppm) | Electrical Conductivity (µS/cm) * | pH | Redox (mV) |
|---|---|---|---|---|---|---|
| **BH01** | 19.5 | 4.87 | 1030 | 358.9 | 4.32 | -127.8 |
| **BH03A** | 19.7 | 6.00 | 1249 | 392.7 | 4.12 | 22.8 |
| **BH04** | 19.8 | 1.72 | 136.10 | 255.9 | 4.34 | 100.7 |

Notes: *Calculated from TDS result

The samples were tested at a NATA accredited laboratory for a suitable of potential contaminants of concern, further detailed in the DSI report (Douglas, 2025b) with detailed results attached in Appendix C. From the groundwater samples tested, all reported concentrations of PAH, PCB, OCP, OPP and Phenol were below the PQL and below the adopted SAC. Concentrations of metals, TRH, BTEX, PFAS and VOC were above the PQL but all within the adopted SAC with the exception of metal and PFAS in the following samples:

Total heavy metals:

- Chromium in BH01 at 22 µg/L, BH03A at 80 µg/L, and BH4 at 10 µg/L which exceeded the DGV of 4.4 µg/L;
- Copper in all samples ranging from 11 to 88 µg/L which exceeded the DGV of 1.3 µg/L;
- Lead in BH01 at 16 µg/L, BH3A at 73 µg/L, and BH04 at 9 µg/L which exceeded the DGV of 4.4 µg/L;
- Nickel in all samples ranging from 19 to 52 µg/L which exceeded the DGV of 7 µg/L; and
- Zinc in in all samples ranging from 24 to 190 µg/L which exceeded the DGV of 8 µg/L.

Dissolved heavy metals:

- Copper in all samples ranging from 10 to 23 µg/L which exceeded the DGV of 1.3 µg/L;
- Nickel in all samples ranging from 12 to 34 µg/L which exceeded the DGV of 7 µg/L; and
- Zinc in in all samples ranging from 23 to 27 µg/L which exceeded the DGV of 8 µg/L.

PFAS:

- PFOS in all tested samples ranging from 0.0008 to 0.0042 µg/L which exceeded the DGV of 0.00023 µg/L.

It is noted that the concentrations / exceedances of heavy metals were significantly higher in the form of total metals than dissolved metals. For dissolved metals, elevated concentrations were only detected for copper, nickel and zinc.

Based on the site topography, BH04 and BH03A can be considered 'up-gradient' wells which are most likely to be indicative of the groundwater condition in the surrounding area. In general, the elevated concentrations of copper, nickel, zinc and PFAS are higher in the samples BH04 and BH03A (up-gradient) than the sample BH01 (down-gradient). In addition, based on our experience, the elevated concentrations of copper, nickel, zinc and PFAS are considered to be within the normal range of background levels in heavily urbanised areas of Sydney.

# 5. Groundwater Inflow Assessment

## 5.1 Numerical modelling methodology

A 3-dimensional (3D) numerical groundwater model was developed. The modelling was carried out using the finite element hydrogeological software SEEP3D (version 2023.1.2) (a component of GeoStudio) developed by GEOSLOPE International Ltd. Steady state analysis was undertaken to assess the potential dewatering rates and volumes for a drained basement.

The numerical groundwater modelling methodology comprised the following:

- A steady-state seepage analysis model for the long-term (post construction) inflow rates for the basement;
- The topography of the model was created by using NSW foundation spatial services, elevation and depth (ELVIS) contour data. A surface mesh was then created from these contours in SEEP3D to form the approximate topography of the area.
- The 3D model is approximately 330 m x 350 m in area with the site located approximately in the centre. The depth of the model extends to around 65 m below the BEL of the development. The model is shown below in Figure 1;
- BELs of RL 26.9 m and RL 27.3 m for the stepped basement excavation have been adopted;
- A single-layer subsurface profile of sandstone bedrock was adopted as the groundwater was observed to be wholly within the bedrock profile. For the base case, a 'moderately conservative' horizontal permeability ($k_h$) of 3 x $10^{-8}$ m/s was adopted for sandstone bedrock based hydraulic conductivity testing results (Section 3.3). This parameter is consistent with ranges of values documented in the available literature for similar lithologies (e.g. Hoek & Bray 1981 and more recently Pells 2019) and Douglas' previous experience with similar materials;
- A vertical to horizontal ratio of 0.2 has been adopted for the base case;
- Monitoring indicates that the Hawkesbury Sandstone beneath the site does not behave as a single, hydraulically homogeneous aquifer. Instead, distinct hydraulic heads are observed at different wells with different screened intervals. This is more consistent with a vertically heterogeneous, fractured rock aquifer system. However, for simplicity of this GIA, the potential multiple groundwater tables and the unsaturated zones between each other were omitted and one continuous initial phreatic surface was adopted.
- Groundwater total head boundary conditions have been placed along the sides of the model to simulate initial phreatic surface through the site being consistent with the highest levels

recorded during the groundwater monitoring. The initial groundwater contour lines through the site are shown in Figure 2;

- A recharge boundary condition was assigned to the surface to represent rainfall infiltration. As the site land use is classified as high-density urban, rainfall recharge to the groundwater table is predicted to be minimal (1% infiltration of 1.6 m annual rainfall).
- A 'free flow' boundary or 'drained' boundary condition (i.e. 0 $m^3$/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 and continuous dewatering.

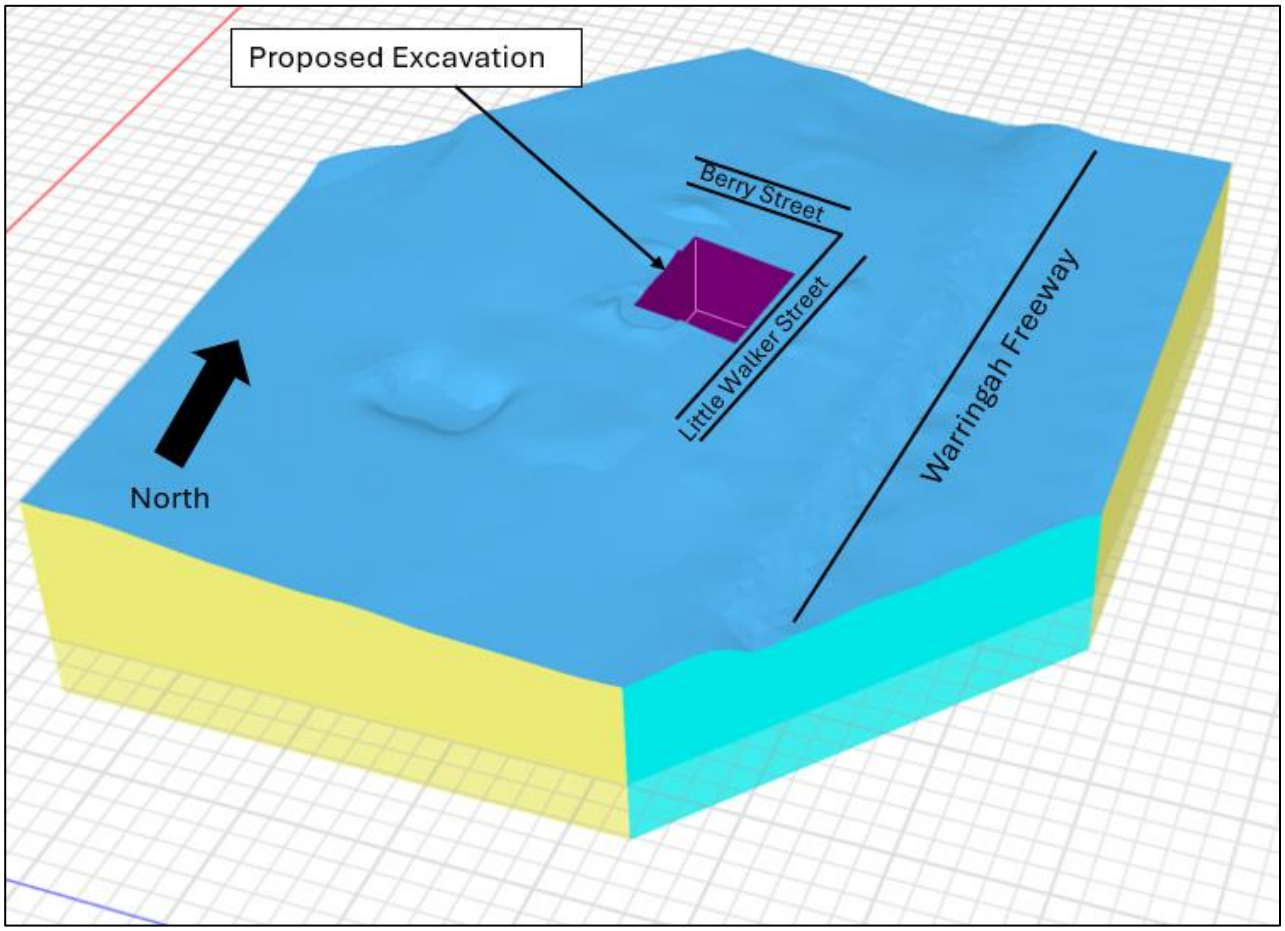



**Figure 1: SEEP3D Model**

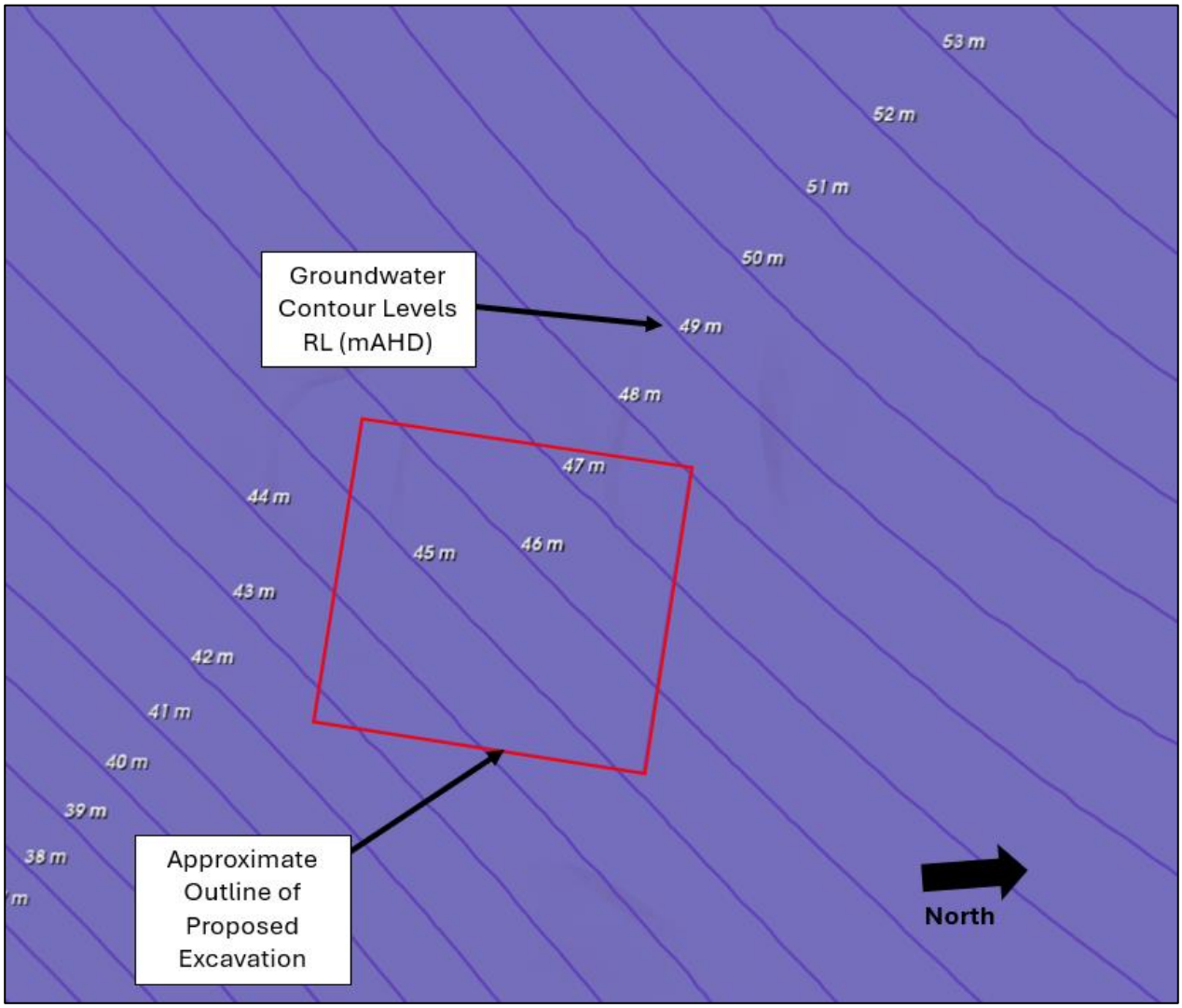



**Figure 2: Initial Groundwater Contours**

## 5.2 Model layers

As the groundwater is wholly within the bedrock profile, only one layer was modelled. Adopted hydraulic properties are presented in Table 7.

**Table 7: Model layers and adopted hydraulic properties (base case)**

| Case | Material | Saturated Kh (m/s) | Anisotropy Ratio (Kv/Kh) | Residual Water Content (%) | Saturated Water Content (%) | Material Model Adopted |
|---|---|---|---|---|---|---|
| Base Case | Sandstone | $3 \times 10^{-8}$ | 0.2 | 5 | 20 | Unsaturated / saturated |

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

5.3

## 5.3 Sensitivity Analysis

Two sensitivity cases were analysed with the following parameters:

- Case 1 – Increased vertical to horizontal permeability ratio of 0.5; and
- Case 2 – Higher (5 x base case) horizontal permeability of 1.5 x $10^{-7}$ m/s.

## 5.4 Groundwater Seepage Results

Table 8 below summarises the estimated total inflow rates for the base and sensitivity cases on completion of bulk excavation for each groundwater level case:

**Table 8: Summary of Estimated Total Groundwater Inflow Rates**

| Case | Estimated Total Groundwater Inflow Rates | |
|---|---|---|
| | L/day | ML/year |
| Base | 3,724 | 1.4 |
| Sensitivity Case 1 | 4,208 | 1.5 |
| Sensitivity Case 2 | 18,490 | 6.8 |

For perspective, the flow from just one garden tap is around 10 to 20 litres per minute which adds up to between 5ML/year to 10ML/year, highlighting how even small sources can contribute significant inflow volumes over time.

Design of the drainage system should have redundancy for high inflows and should be adjusted during the excavation if required. The actual inflows will only be known when the excavation is completed. Additional allowance for higher flows following rainfall and other factors should be made.

Initial groundwater inflows into the excavation may be higher during excavation.

## 5.5 Drawdown and Settlement

The drawdown contours are produced by subtracting the predicted water levels from the initial calibrated groundwater levels. The predicted drawdown contours during long term dewatering of the proposed drained basement is illustrated in Figure 3 (under base case conditions). The contours indicate maximum drawdown levels of around 17 m immediately behind the basement excavation will occur and gradually reducing to less than 1 m around 115 m upstream and 90 m downstream.

The groundwater drawdown will occur within the sandstone bedrock. Neighbouring structures and pavements are therefore not expected to experience noticeable dewatering-induced settlement, due to the significant deformation modulus of sandstone bedrock.

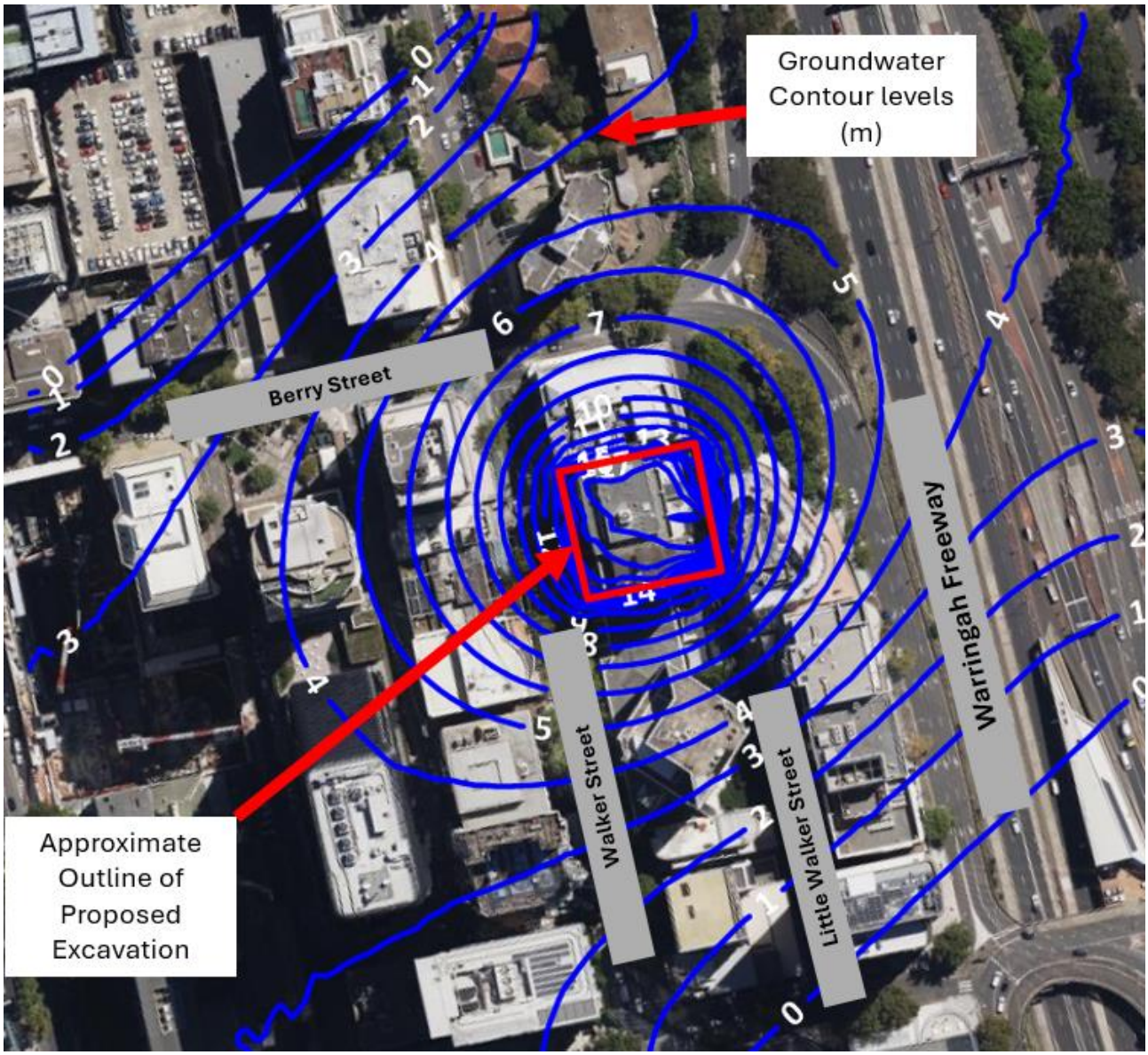



**Figure 3: Groundwater contour drawdown lines on completion of basement excavation and during continuous dewatering (mAHD)**

### 5.6 Review of Hydrogeological Concept Model

The predicted inflows are less than 3ML annually and are 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.

# 6. Dewatering Management

## 6.1 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. The rock profile on the site is of relatively low permeability with low yield, and is considered to be a "less productive groundwater source" as outlined in the AIP.

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 highly productive sand aquifers:

- 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.

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 known sensitive receptors nearby (within 500 m) of the site and therefore, there are no expected impacts to GDEs. |
| Water supply losses by neighbouring groundwater users | There are no recorded groundwater users near to the site. The reduced hydraulic gradient (discussed in Section 5.5) immediately adjacent to the drained excavation is therefore considered to have no impact to surrounding groundwater users. |
| Potential subsidence of neighbouring structures | Groundwater has been encountered with the rock profile therefore, drawdowns are not expected to cause settlement issues or impact neighbouring properties.<br>There is no expected mounding as the site is proposed to be drained. |
| Mounding of water upgradient of structure | |

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.

## 6.2 Approvals and Exemptions

In accordance with the Water Management Act 2000, approval for the take of water for the purpose of long-term dewatering of a drained basement would be given when development consent for the SSDA is granted by the Environmental Planning Instrument. A separate Water

Supply Works Approval (WSWA) to WaterNSW would not be required, unless this is specifically requested in the development conditions.

In accordance with the Water Management (General) Regulation (2018), extraction of water from the greater metropolitan region groundwater source for the purpose of construction dewatering are currently exempt from requiring a Water Access License (WAL) under the coastal construction of infrastructure exemption clause.

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

Actual inflow volumes will only be known at the time of excavation and allowances for variation in the inflow rate should be made. In this regard, inflow volume records during construction when actual inflows are known should be maintained and reported to DCCEEW within 28 days of the water year finishing (ie. Before 28 July).

## 6.3 Dewatering Methodology

Excavations for the basement would commence following the construction of the soldier pile wall and be undertaken in progressive 1.5 m drops, with strip drains and reinforced shotcrete installed between piles. Groundwater (when encountered) is expected to be managed onsite via a sump and pump system which would discharge into a series of treatment, sedimentation and holding tanks prior to allow for management of groundwater quality prior to off-site disposal. Principals of treating groundwater are provided in Section 6.3.1.

The treated groundwater could be discharged into a Council stormwater system pit following written authorisation from Council. If authorised, the point of connection will need to be determined by the dewatering contractor and principal contractor, in consultation with Council. The treated water would likely be discharged directly into an open manhole or pit via a hose connection, with an exclusion zone and berms set up around the periphery to mitigate discharge to surrounding lands. The discharge flow rate into the Council system will be limited to a maximum of 25 litres per second.

### 6.3.1 Groundwater Treatment

Treatment of extracted groundwater will be undertaken within a series of treatment and sedimentation tanks prior to any discharge, to be determined by a dewatering contractor. The system may need to be reviewed and adjusted as the works progress depending on groundwater discharge quality.

In principle, the following treatments may be required for the key analytes and parameters of concern that were identified in the DSI (Douglas, 2025b):

- pH adjustment – application of acids to increase pH or lime (base) to reduce ph.
- Reduction of suspended solids – application of flocculant & coagulating agents.
- Reduce heavy metals – pH treatment, suspended solids treatment and use of appropriate media filters.

- Removal of organics (if identified) and PFAS – use of microbial decomposition tanks and / or carbon filtration.

### 6.3.2 Groundwater Monitoring, Sampling and Testing

Further analysis and testing will be undertaken during the dewatering and prior to discharge in the stormwater system. Monitoring frequencies during dewatering activities for extracted groundwater volume and key parameters and analytes are presented in Table 10.

**Table 10: Baseline Data Requirements (from Groundwater Sumps and/or Monitoring Bores)**

| Parameter/ Analyte | Monitoring Frequency, Reporting and Notes |
|---|---|
| **Groundwater level monitoring** | Continuous groundwater level monitoring using data logger recording at hourly intervals in monitoring wells in the vicinity of the site unless approved otherwise. Manual readings to be obtained daily for the first week of dewatering then weekly, with weekly data logger downloads until bulk excavation is completed and water levels stabilise. Ongoing monitoring needs to be assessed by geotechnical consultant at the time.<br>This requirement could be deleted given the low impact but this is subject to approval by the approving authority. |
| **Extracted groundwater volume** | Daily measurements from calibrated flow meter during ongoing dewatering during the first two weeks of dewatering. Monthly monitoring may be appropriate where stabilised readings are obtained. |
| **pH, conductivity dissolved oxygen and turbidity** | A total of three rounds of sampling and testing (field and laboratory) across the first week, then twice weekly thereafter during continuous dewatering. Sample(s) should be obtained from the collection system (pre-treatment) and holding tanks (post treatment). Results will need to below thresholds prior to discharge.<br>Laboratory testing should be undertaken in conjunction with field measurements (using suitable on-site probes / testing kits) to establish correlations. Laboratory testing frequency may be reduced following a review of the results by the environmental consultant and approval from council.<br>**HOLD POINT** - If the acceptance criteria are exceeded, discharge will be suspended until further analytical testing is completed and advice is provided by the environmental contractor. |
| **Oil and grease (if encountered)** | Visual inspections twice daily by contractor.<br>No visible oil and grease, 'sheen' and/ or no significant discolouration or odours should be observed.<br>**HOLD POINT** - If any of the above signs are noted, then discharge will be suspended until further analytical testing is completed and advice is provided by the environmental contractor. |

| Parameter/ Analyte | Monitoring Frequency, Reporting and Notes |
|---|---|
| **Metals (total and dissolved); TRH/ BTEX; PAH; ferrous iron, sulphate, ether oxygenates and nitrates; VOC; OCP / OPP; PCB; phenols and PFAS.**<br>**Metals; TRH/ BTEX; PAH; ferrous iron, sulphate, ether oxygenates and nitrates; VOC; OCP / OPP; PCB; phenols and PFAS. (Continued)** | Sampling undertaken every second day for the first week (i.e. 3 sampling events) to account for any potential contaminants and stabilisation of water quality. Sample(s) should be obtained from the collection system (pre-treatment) and holding tanks (post treatment). Results will need to below thresholds prior to discharge.<br>Subsequently, sampling will be conducted before each discharge event.<br>If seepage water concentrations exceed assessment criteria, then discharge is to be immediately halted, and the contingency strategy adopted.<br>**HOLD POINT** - If the acceptance criteria are exceeded, discharge will be suspended until further analytical testing is completed and advice is provided by the environmental contractor. |

Procedures for field measurements, sampling, and record keeping shall be established by a suitably qualified environmental consultant. Samples should be collected by the environmental consultant and analysed at a NATA accredited laboratory. Samples will be recorded using industry standard Chain of Custody (COC) documentation, including the date, name and signature of sampler, sample ID, and transportation records to the NATA accredited laboratory.

Testing frequency and analysis requirements may be reviewed in consultation with the environmental consultant and approval from Council, dependent upon ongoing results.

## 7. References

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Water Management (General) Regulation. (2018).

## 8. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 153-157 Walker Street, North Sydney NSW in line with Douglas' proposal dated 21 January 2025 and acceptance received from Simon Liang of Freecity Group Holdings Pty Ltd dated 4 February 2025. This report is provided for the exclusive use of Freecity Group Holdings 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 previous investigations. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

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

This report must be read in conjunction with all 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 – Groundwater Impact Assessment Information

About This Report

Figure 4:  Summary of groundwater monitoring and rainfall data

Table 11:  Summary of rainfall data from Sydney Botanical Garden weather station

# About this Report

November 2023

## 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.

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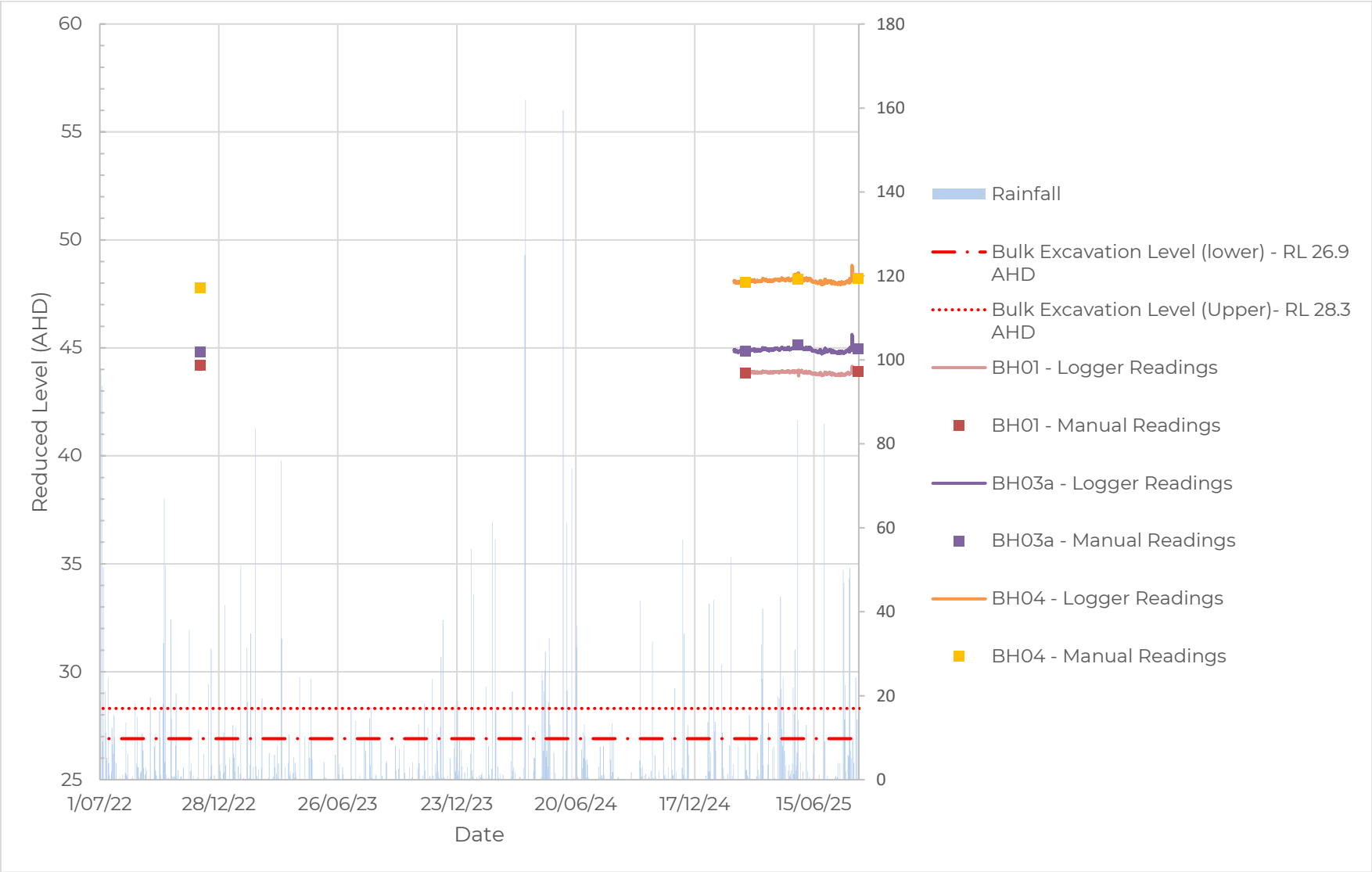



**Figure 4: Summary of groundwater monitoring and rainfall data.**

**Table 11: Summary of rainfall data from Sydney Botanical Garden weather station (Australia Government, 2025)**

| Statistic | Recorded Rainfall (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| Highest | 400.7 | 664.7 | 520.9 | 455.2 | 642.1 | 681.4 | 346.5 | 532.3 | 257.1 | 320.8 | 517.3 | 403.4 | 2243.7 |
| 90th %ile | 201.2 | 248.3 | 282.2 | 269.1 | 254.0 | 295.1 | 225.9 | 184.5 | 152.3 | 177.6 | 169.2 | 163.5 | 1607.4 |
| Average | 104.0 | 118.1 | 136.7 | 123.0 | 120.3 | 133.8 | 96.2 | 84.9 | 67.8 | 76.4 | 86.0 | 82.5 | 1228.9 |
| Median | 80.8 | 81.7 | 101.6 | 87.6 | 88.8 | 93.8 | 75.2 | 57.4 | 52.8 | 52.1 | 73.0 | 66.2 | 1169.2 |
| 10th %ile | 29.6 | 19.0 | 34.6 | 24.7 | 18.7 | 24.1 | 12.6 | 9.8 | 10.2 | 16.5 | 12.4 | 23.5 | 853.5 |
| Lowest | 0.0 | 2.0 | 2.5 | 0.5 | 2.6 | 3.8 | 1.5 | 0.0 | 0.0 | 0.6 | 0.5 | 1.9 | 552.3 |
| 2022 | 155.8 | 364.4 | - | 269.1 | 233.5 | 22.5 | - | 69.4 | 100.3 | 273.7 | 60 | 71.2 | - |
| 2023 | 159 | 182.4 | 52.6 | 169.2 | 64.2 | 16.4 | 36.6 | 73.6 | 29.7 | 37.8 | 127.3 | 118.3 | 1067.1 |
| 2024 | 122.2 | 175.5 | 36 | 327.4 | 231.7 | - | 70.8 | 52.1 | 55.8 | 47.4 | 113.6 | 65.4 | - |
| 2025 | 185 | 75.5 | 168.6 | 161.5 | 253 | 23.8 | 172.2 | - | - | - | - | - | - |

Notes: dash "-" indicates no data was available for the monitoring period

Below 10th percentile monthly rainfall
Below median monthly rainfall
Above average monthly rainfall
Above 90th percentile monthly rainfall

**Appendix B - Information from Geotechnical Report (Douglas, 2025)**

Drawing 001 – Test Location Plan

Drawing 002 – Interpreted Geotechnical Cross-Section A-A'

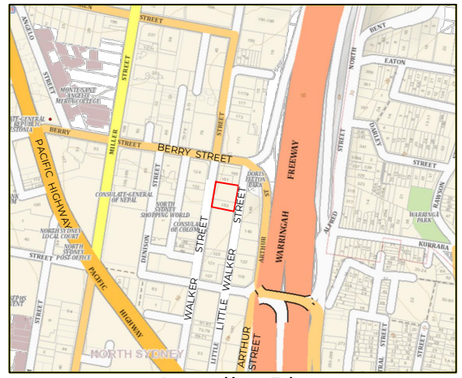
Drawing 003 – Interpreted Geotechnical Cross-Section B-B'

Drawing 004 – Interpreted Geotechnical Cross-Section C-C'

Drawing 005 – Interpreted Geotechnical Cross-Section D-D'

Borehole Logs (BH01, BH02, BH03A, BH04 and BH201)




Locality Plan

NOTE:
1: Base image from MetroMap (Dated 13.06.2022)
2: Basement footprint from Architectus, Project No.240626, Drawing No. A.DA0096, Issue P6 (18.12.2024)

0 1 2 4 6 8 10 15 20 30m
1:300 @ A3

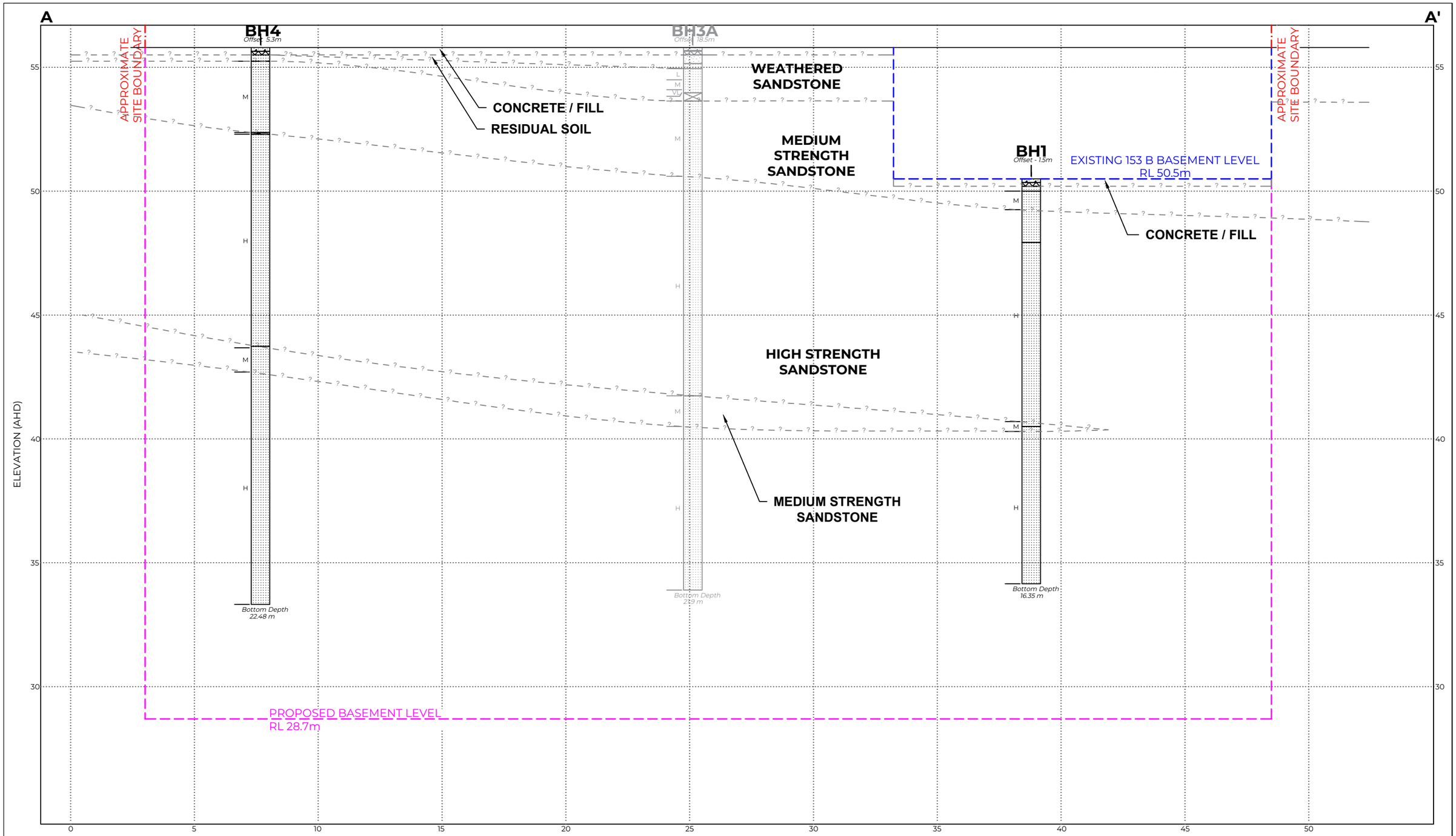
**LEGEND**

- Borehole Test Location
- Site Boundary
- Proposed Basement Level Outline
- Existing Basement Level of 153 Building Outline
- Geological Cross Section

Douglas PARTNERS

| | | |
|---|---|---|
| CLIENT: Freecity Group Holdings Pty Ltd | | TITLE: **Test Location Plan** |
| OFFICE: Sydney | DRAWN BY: MN/EC | **Proposed Residential Development** |
| SCALE: 1:300 @ A3 | DATE: 20.08.2025 | **153-157 Walker Street, North Sydney** |

PROJECT No: 233796.00
DRAWING No: 1
REVISION: 0




LEGEND

- Core Loss
- Concrete
- Filling
- Sand
- Sandstone

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.

ROCK STRENGTH

- EL - Extremely Low
- VL - Very Low
- L - Low
- M - Medium
- H - High
- VH - Very High

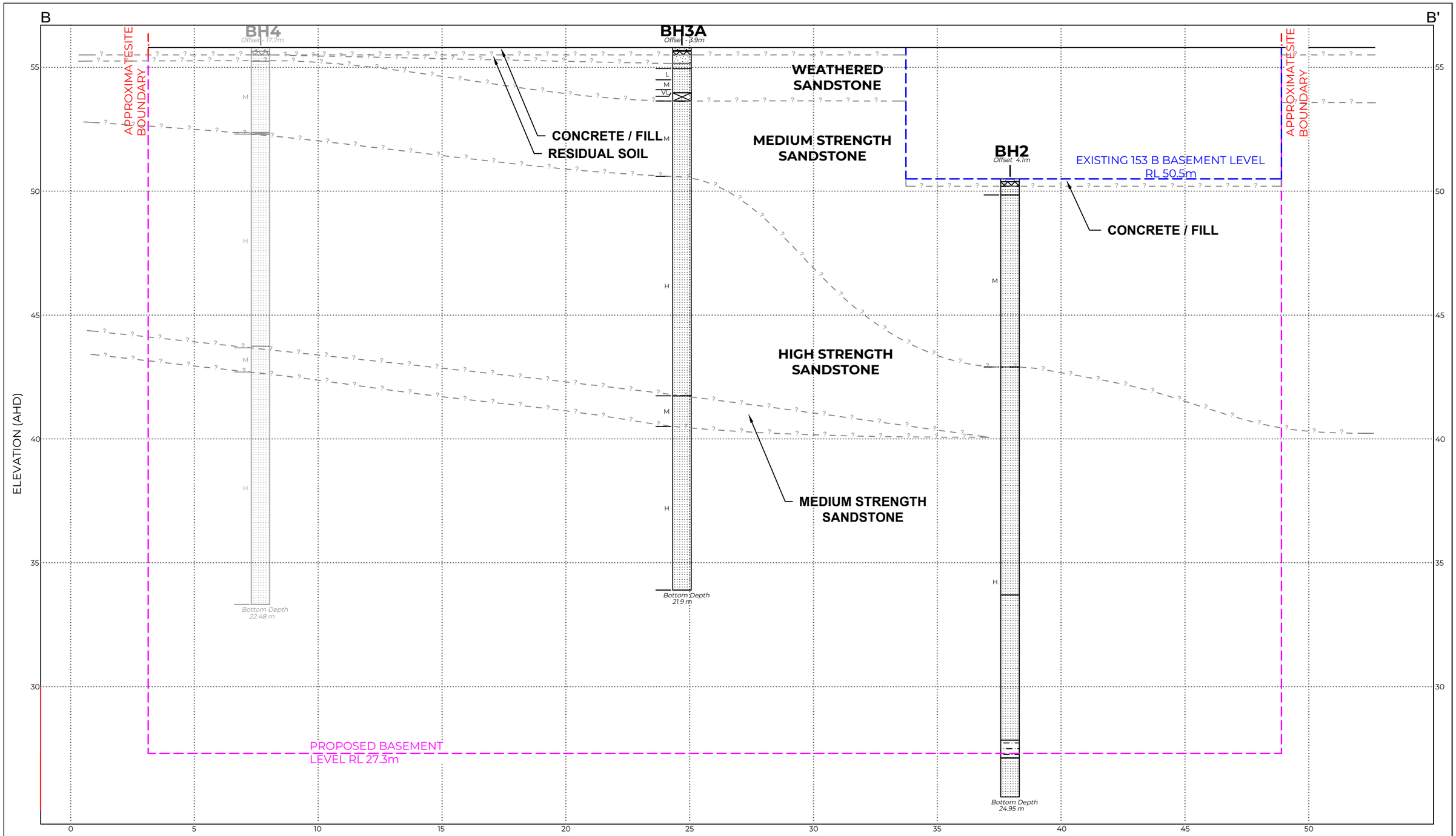
TESTS / OTHER

— ? — — - Interpreted geotechnical boundary

0 3
Horizontal Scale (metres)
Vertical Exaggeration = 2.0

Douglas PARTNERS

| | | | |
|---|---|---|---|
| CLIENT: Freecity Group Holdings Pty Ltd | | TITLE: **Interpreted Geotechnical Cross-Section A-A'** | PROJECT No: 233796.00 |
| OFFICE: Sydney | DRAWN BY: MN | Propose Mixed Use Development | DRAWING No: 2 |
| SCALE: 1:150 (H) 1:150 (V) @ A3 | DATE: 12.06.2025 | 153 - 157 Walker Street, North Sydney | REVISION: 0 |




LEGEND

- Core Loss
- Concrete
- Filling
- Sand
- Sandstone

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.

ROCK STRENGTH

EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High

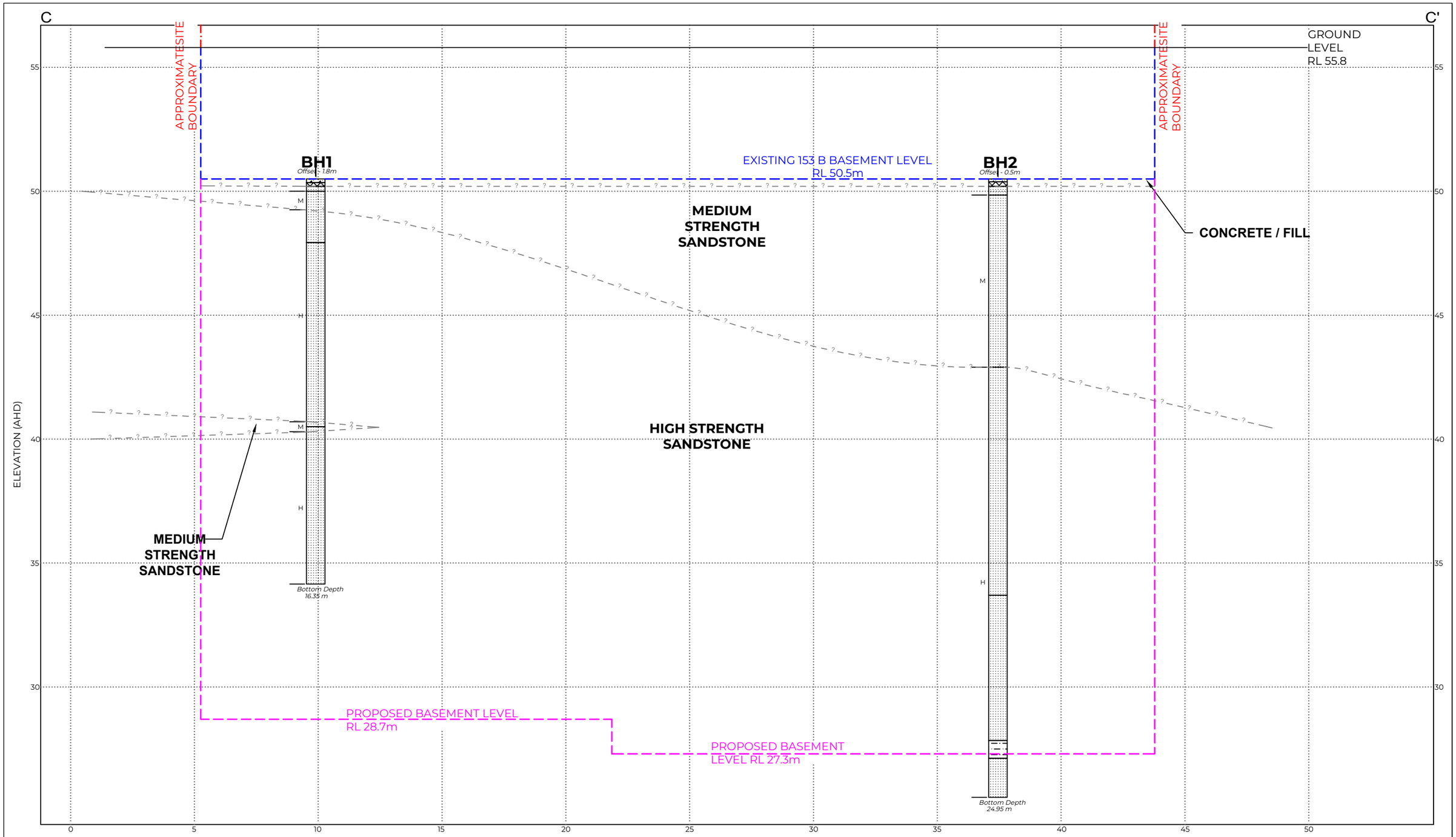
TESTS / OTHER

— ? — — - Interpreted geotechnical boundary

0 3
Horizontal Scale (metres)
Vertical Exaggeration = 2.0

Douglas PARTNERS

| | | | |
|---|---|---|---|
| CLIENT: Freecity Group Holdings Pty Ltd | | TITLE: **Interpreted Geotechnical Cross-Section B-B'** | PROJECT No: 233796.00 |
| OFFICE: Sydney | DRAWN BY: MN | Propose Mixed Use Development | DRAWING No: 3 |
| SCALE: 1:150 (H) 1:150 (V) @ A3 | DATE: 12.06.2025 | 153 - 157 Walker Street, North Sydney | REVISION: 0 |




LEGEND

- Concrete
- Filling
- Sandstone
- Siltstone

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.

ROCK STRENGTH

EL - Extremely Low
VL- Very Low
L - Low
M - Medium
H - High
VH- Very High

TESTS / OTHER

— ? — — - Interpreted geotechnical boundary

0 3
Horizontal Scale (metres)
Vertical Exaggeration = 2.0

Douglas PARTNERS

| | | | |
|---|---|---|---|
| CLIENT: Freecity Group Holdings Pty Ltd | | TITLE: **Interpreted Geotechnical Cross-Section C-C'** | PROJECT No: 233796.00 |
| OFFICE: Sydney | DRAWN BY: MN | Propose Mixed Use Development | DRAWING No: 4 |
| SCALE: 1:150 (H) 1:150 (V) @ A3 | DATE: 12.06.2025 | 153 - 157 Walker Street, North Sydney | REVISION: 0 |

D

D'

APPROXIMATE SITE BOUNDARY

APPROXIMATE SITE BOUNDARY

**BH04**
*Offset 4.7m*

**BH3A**
*Offset - 11.3m*

**BH201**
*Offset - 4.3m*

CONCRETE / FILL

WEATHERED SANDSTONE

MEDIUM - HIGH STRENGTH SANDSTONE

HIGH STRENGTH SANDSTONE

PROPOSED BASEMENT LEVEL RL 28.7m

PROPOSED BASEMENT LEVEL RL 27.3m

ELEVATION (AHD)

DISTANCE ALONG PROFILE (m)

LEGEND

- Concrete
- Filling
- Sandstone
- Sand
- Core Loss

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.

ROCK STRENGTH

- EL - Extremely Low
- VL- Very Low
- L - Low
- M - Medium
- H - High
- VH- Very High

TESTS / OTHER

— ? — — - Interpreted geotechnical boundary

Horizontal Scale (metres)
Vertical Exaggeration = 0.5

Douglas PARTNERS

| | | | |
|---|---|---|---|
| CLIENT: Freecity Group Holdings Pty Ltd | | TITLE: **Interpreted Geotechnical Cross-Section D-D'** **Proposed Commercial Development** **153-157 Walker St, North Sydney** | PROJECT No: 233796.00 |
| OFFICE: Sydney | DRAWN BY: EC | | DRAWING No: 5 |
| SCALE: 1:150 (H) 1:300 (V) @ A3 | DATE: 20.08.2025 | | REVISION: 0 |

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334307.0, N:6254383.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH01
**PROJECT No:** 233796.00
**DATE:** 09/11/22 - 11/11/22
**SHEET:** 1 of 2

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | | | | | | | SAMPLE | | | | TESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | SOIL | | | ROCK | | | | | | | | | | | | | | | | | |
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS.(†) DENSITY.(†) | MOISTURE | WEATH. | DEPTH (m) | STRENGTH VL L M H VH EH | RECOVERY (%) | RQD | FRACTURE SPACING (m) 0.005 0.05 0.10 0.50 1.00 >1.00 | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| 09/11/22 No free groundwater observed during augering | 50 | 0.15 | CONCRETE | | | | | | | | | | | | | | | | PID | PID= 6.2 ppmppm |
| | | 0.30 | FILL/Gravelly SAND: fine to medium, dark grey-brown, medium to coarse, angular to sub-angular igneous gravel, wet | | | | | | | | | | | | | | | | | |
| | | 0.50 | SANDSTONE: grey, inferred very low to low strength | | | | | SW | 0.50 | M | 100 | 100 | | | | | | 1 | PLT | PL(A)=0.90MPa |
| | 49 | 1 | | | | | | | 1.25 | | | | | | | | | | | |
| | | | SANDSTONE: medium to coarse grained, grey and dark brown, medium then high strength, slightly to moderately weathered, unbroken, Hawkesbury Sandstone | | | | | MW | 1.82 | | 100 | 100 | | | | | | 2 | PLT | PL(A)=1.0MPa |
| | | 2 | | | | | | | 2.20 | | | | | | | | | | | |
| | 48 | 2.57 | SANDSTONE: medium to coarse grained, pale grey and pale brown, distinctly bedded at 0-10°, high strength, slightly to moderately weathered, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | | | | | 3 | PLT | PL(A)=1.3MPa |
| | | 3 | | | | | | | | | 100 | 100 | | | | | | | | |
| | 47 | | | | | | | | | | | | | | | | | 4 | PLT | PL(A)=1.4MPa |
| | | 4 | | | | | | | | | 100 | 94 | | | | | | | | |
| | 46 | | | | | | | SW | | H | | | | | | | | 5 | PLT | PL(A)=1.2MPa |
| | | 5 | | | | | | | | | | | | 5.56m: , B5°,pl,ro,cly vn<br>5.59m: , Ds10mm<br>5.60m: , J40-50°,pl,he,cly vn | | | | | | |
| | 45 | | | | | | | | | | 100 | 99 | | 6.28m: , Cs, 20 mm<br>6.53m: , J40-50°,pl,ro,fe stn | | | | 6 | PLT | PL(A)=1.0MPa |
| | | 6 | | | | | | | | | | | | | | | | | | |
| | 44 | | | | | | | | | | | | | | | | | 7 | PLT | PL(A)=1.2MPa |
| | | 7 | | | | | | | 7.60 | | | | | | | | | | | |
| | 43 | | | | | | | | | | 100 | 100 | | 7.84m: , B0-5°,pl,ro,fe stn | | | | 8 | PLT | PL(A)=1.4MPa |
| | | 8 | | | | | | MW | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | 8.64m: , Cs,20mm | | | | 9 | PLT | PL(A)=1.4MPa |
| | | 9 | | | | | | | | | 100 | 95 | | 9.38m: , B5°,pl,ro,cly vn | | | | | | |
| | 41 | | | | | | | | 9.70 | | | | | | | | | | | |
| | | | | | | | | SW | 9.80 | M | | | | | | | | | PLT | PL(A)=0.70MPa |

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.

Generated with CORE-GS by Geroc - Combined Log

**PLANT:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.50m, NMLC coring to 16.35m. HW to 0.5 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 16.35m (sump: 16.0 to 16.35, screen: 1.5m to 16.0m, Solid PVC 0.1m to 1.5m, Gravel 1.0m to 16.35m, Bentonite Backfill 0.1m to 1.0m, Gatic Cover at top). BH co-ordinates have been approximated
Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334307.0, N:6254383.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH01
**PROJECT No:** 233796.00
**DATE:** 09/11/22 - 11/11/22
**SHEET:** 2 of 2

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL ORIGIN(#) | SOIL CONSIS.(†) DENSITY.(*) | SOIL MOISTURE | ROCK WEATH. | ROCK DEPTH (m) | ROCK STRENGTH | ROCK RECOVERY (%) | ROCK RQD | ROCK FRACTURE SPACING (m) | ROCK DEFECTS & REMARKS | SAMPLE REMARKS | SAMPLE TYPE | SAMPLE INTERVAL | DEPTH (m) | TESTING TEST TYPE | TESTING RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10.00 | 10 | SANDSTONE: medium to coarse grained, pale grey, distinctly bedded at 0-10°, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | 10.00 | M | 100 | 95 | | 10.08m: , B5°,pl,ro,cly vn | | | | | | |
| | 40 | | | | | | | | 10.20 | | | | | | | | | | | |
| | 11 | | | | | | | | | | 100 | 100 | | 11.44m: , B5°,pl,ro,cly vn | | | | 11 | PLT | PL(A)=1.5MPa |
| | 39 | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | FR | | | | | | 12.10m: , B5°,pl,he,cly vn | | | | 12 | PLT | PL(A)=1.3MPa |
| | 38 | | | | | | | | | | 100 | 100 | | | | | | | | |
| | 13 | | | | | | | | | H | | | | 12.85m: , B5°,pl,ro,cly vn | | | | 13 | PLT | PL(A)=1.2MPa |
| | 37 | | | | | | | | | | | | | | | | | | | |
| | 14 | | 13.90m: 13.90-15.44m: dark brown, moderately weathered | | | | | | 13.90 | | 100 | 100 | | | | | | 14 | PLT | PL(A)=2.0MPa |
| | 36 | | | | | | | MW | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | | | | | 15 | PLT | PL(A)=1.8MPa |
| | 35 | | | | | | | | 15.44 | | 100 | 96 | | 15.48m: , B5°,pl,he,cly vn 15.54m: , B5°,pl,ro,cly vn | | | | | | |
| | 16 | | | | | | | FR | | | | | | | | | | 16 | PLT | PL(A)=1.0MPa |
| | | | | | | | | | | | | | | | | | | | PLT | PL(A)=1.0MPa |
| | | 17 | Borehole discontinued at 16.35m depth. Target depth reached. | | | | | | | | | | | | | | | | | |
| | | 18 | | | | | | | | | | | | | | | | | | |
| | | 19 | | | | | | | | | | | | | | | | | | |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.50m, NMLC coring to 16.35m. HW to 0.5 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 16.35m (sump: 16.0 to 16.35, screen: 1.5m to 16.0m, Solid PVC 0.1m to 1.5m, Gravel 1.0m to 16.35m, Bentonite Backfill 0.1m to 1.0m, Gatic Cover at top). BH co-ordinates have been approximated
Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334307.0, N:6254383.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH01
**PROJECT No:** 233796.00
**DATE:** 09/11/22 - 11/11/22
**SHEET:** 1 of 1




**0.50-16.35 m depth**

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Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334334.0, N:6254380.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH02
**PROJECT No:** 233796.00
**DATE:** 11/11/22 - 16/11/22
**SHEET:** 1 of 3

**CONDITIONS ENCOUNTERED** | **SAMPLE** | **TESTING**

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL: ORIGIN(#) | SOIL: CONSIS.(†) DENSITY.(†) | SOIL: MOISTURE | ROCK: WEATH. | ROCK: DEPTH (m) | ROCK: STRENGTH | ROCK: RECOVERY (%) | ROCK: RQD | ROCK: FRACTURE SPACING (m) | ROCK: DEFECTS & REMARKS | SAMPLE: SAMPLE REMARKS | SAMPLE: TYPE | SAMPLE: INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/11/22 No free groundwater observed during augering | 50 | 0.12 | CONCRETE | | | | | | | | | | | | | | | | PID | PID= 6.5 ppmppm |
| | | 0.30 | FILL/Gravelly SAND: fine to medium, dark grey-brown, medium to coarse, angular to sub-angular igneous gravel, wet | | | | | | | | | | | | | | | | | |
| | | 0.65 | SANDSTONE: dark brown, inferred very low to low strength | | | | | | 0.65 | | 100 | 100 | | | | | | 1 | PLT | PL(A)=0.50MPa |
| | 49 | 1 | SANDSTONE: medium to coarse grained, dark brown then pale grey-yellow, medium strength, moderately then slightly weathered, unbroken then slightly fractured, Hawkesbury Sandstone | | | | | MW | | | 100 | 100 | | | | | | | | |
| | 48 | 2 | | | | | | | | | | | | | | | | 2 | PLT | PL(A)=0.70MPa |
| | | 3 | | | | | | | 3.20 | | 100 | 100 | | | | | | 3 | PLT | PL(A)=0.70MPa |
| | 47 | | | | | | | | | | | | | | | | | | PLT | PL(A)=0.80MPa |
| | | 4 | | | | | | | | M | | | | 4.03m: , 3.89-4.17m: J60-80°, pl, ro, cly vn | | | | 4 | | |
| | 46 | | | | | | | | | | 100 | 100 | | | | | | | PLT | PL(A)=0.60MPa |
| | | 5 | | | | | | | | | | | | 4.88m: , 4.84-4.94m: J40-60°, pl, ro, fe stn | | | | 5 | | |
| | 45 | | | | | | | | | | | | | 5.25m: , B5°,pl,ro,fe stn | | | | | PLT | PL(A)=0.70MPa |
| | | 6 | | | | | | SW | | | 100 | 71 | | 5.85m: , 5.70-6.00m: J60-80°, pl, ro, cly vn<br>5.93m: , Fg, 70 mm<br>6.17m: , Cs, 30mm<br>6.27m: , 6.22-6.32m: J60-80°, pl, ro, cly vn<br>6.31m: , Ds, 20mm | | | | 6 | | |
| | 44 | | | | | | | | | | | | | | | | | | | |
| | | 7 | | | | | | | | | | | | 7.04m: , B0-5°,pl,ro,fe stn/ cly vn | | | | 7 | PLT | PL(A)=0.60MPa |
| | 43 | 7.60 | SANDSTONE: medium to coarse grained, pale grey and dark brown, distinctly and indistinctly bedded at 0-20°, high strength, slightly to moderately weathered, unbroken, Hawkesbury Sandstone | | | | | | 7.60 | | | | | 7.47m: , B0-5°,pl,ro,cly inf 5 mm<br>7.59m: , B0-5°,pl,ro,cly inf 5 mm | | | | | | |
| | | 8 | | | | | | | | | 100 | 94 | | | | | | 8 | PLT | PL(A)=1.9MPa |
| | 42 | | | | | | | | 8.30 | | | | | 8.33m: , B0-5°,pl,he, fe stn<br>8.44m: , B0-5°,pl,ro,fe stn<br>8.67m: , 8.50-8.87m: J60-80°, pl, ro, cly vn fe stn | | | | | | |
| | | 9 | | | | | | MW | | H | | | | | | | | 9 | PLT | PL(A)=1.0MPa |
| | 41 | | | | | | | | | | 100 | 100 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | PLT | PL(A)=1.6MPa |

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.

Generated with CORE-GS by Geroc - Combined Log

**PLANT:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.65m, NMLC coring to 24.95m. HW to 1.0 m.
**CASING:** Uncased
**REMARKS:** 20% water loss from 8.76 to 16.67 m. BH co-ordinates have been approximated from GIS program

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334334.0, N:6254380.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH02
**PROJECT No:** 233796.00
**DATE:** 11/11/22 - 16/11/22
**SHEET:** 2 of 3

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL ORIGIN(#) | SOIL CONSIS.(†) DENSITY.(*) | SOIL MOISTURE | ROCK WEATH. | ROCK DEPTH (m) | ROCK STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | SAMPLE TYPE | SAMPLE INTERVAL | DEPTH (m) | TESTING TEST TYPE | TESTING RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40 | | [CONT] SANDSTONE: medium to coarse grained, pale grey and dark brown, distinctly and indistinctly bedded at 0-20°, high strength, slightly to moderately weathered, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | | | | | | | |
| | 11 | | | | | | | | | | 100 | 100 | | | | | | 11 | PLT | PL(A)=1.2MPa |
| | 39 | | | | | | | | | | | | | 11.70m: , B5°,pl,ro,cly inf 5 mm | | | | | | |
| | 12 | | | | | | | MW | | | 100 | 98 | | | | | | 12 | PLT | PL(A)=2.0MPa |
| | 38 | | | | | | | | | | | | | 12.37m: , B5°,pl,ro,fe stn 12.58m: , Cs,10 mm | | | | | | |
| | 13 | | | | | | | | | | | | | | | | | 13 | PLT | PL(A)=1.9MPa |
| | 37 | | | | | | | | | | | | | | | | | | | |
| | 14 | | | | | | | | 13.80 | | 100 | 100 | | | | | | 14 | PLT | PL(A)=1.0MPa |
| | 36 | | | | | | | SW | | | | | | 14.52m: , B0-5°,pl,ro,cly vn | | | | | | |
| | 15 | | | | | | | | 14.90 | H | | | | | | | | 15 | PLT | PL(A)=2.0MPa |
| | 35 | | | | | | | | | | 100 | 100 | | | | | | | | |
| | 16 | | | | | | | MW | | | 100 | 100 | | | | | | 16 | PLT | PL(A)=1.0MPa |
| | 34 | | | | | | | | | | | | | | | | | | | |
| | | 16.80 | | | | | | | 16.80 | | | | | | | | | | | |
| | 17 | | SANDSTONE: medium to coarse grained, pale grey, massive, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | | | | | 17 | PLT | PL(A)=1.1MPa |
| | 33 | | | | | | | | | | | | | | | | | | | |
| | 18 | | | | | | | | | | 100 | 100 | | | | | | 18 | PLT | PL(A)=1.2MPa |
| | 32 | | | | | | | FR | | | | | | | | | | | | |
| | 19 | | | | | | | | | | 100 | 100 | | | | | | 19 | PLT | PL(A)=1.3MPa |
| | 31 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 100 | 100 | | 19.90m: , B0- | | | | | PLT | PL(A)=1.1MPa |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.65m, NMLC coring to 24.95m. HW to 1.0 m.
**CASING:** Uncased
**REMARKS:** 20% water loss from 8.76 to 16.67 m. BH co-ordinates have been approximated from GIS program

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334334.0, N:6254380.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH02
**PROJECT No:** 233796.00
**DATE:** 11/11/22 - 16/11/22
**SHEET:** 3 of 3

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL ORIGIN(#) | SOIL CONSIS.(†) DENSITY.(*) | SOIL MOISTURE | ROCK WEATH. | ROCK DEPTH (m) | ROCK STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | SAMPLE TYPE | SAMPLE INTERVAL | TESTING DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 | | [CONT] SANDSTONE: medium to coarse grained, pale grey, massive, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | 5°,pl,ro,cly vn | | | | | | |
| | | 20 | 20.60m: 20.60-20.80m: 70% dark grey, siltstone bands | | | | | | | | | | | | | | | | | |
| | 29 | 21 | | | | | | | | | 100 | 100 | | | | | | 21 | PLT | PL(A)=2.5MPa |
| | | 22 | | | | | | | | | | | | | | | | 22 | PLT | PL(A)=2.4MPa |
| | 28 | 22.66 | 22.57m: 22.57-22.66m: quartz clasts to 5 mm | | | | | FR | | H | | | | | | | | | | |
| | | 23 | SILTSTONE: dark grey, high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 93 | | 22.72m: , J40-50°,pl,ro,cly vn<br>22.74m: , 22.66-22.80m: J60-80°, pl, ro, cly vn<br>2328m: , 23.28-23-38m: J60-80°, pl, ro, cly vn<br>2336m: , Ds, 20 mm | | | | 23 | PLT | PL(A)=1.9MPa |
| | 27 | 23.38 | SANDSTONE: medium to coarse grained, pale grey, distinctly bedded at 0-10°, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | | | | | | | | | | | | |
| | | 24 | | | | | | | | | 100 | 100 | | 24.38m: , B0-5°,pl,ro,cbs vn | | | | 24 | PLT | PL(A)=1.2MPa |
| | 26 | 25 | Borehole discontinued at 24.95m depth. Target depth reached. | | | | | | | | | | | | | | | | PLT | PL(A)=1.9MPa |
| | | 26 | | | | | | | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | | | | | | | |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.65m, NMLC coring to 24.95m. HW to 1.0 m.
**CASING:** Uncased
**REMARKS:** 20% water loss from 8.76 to 16.67 m. BH co-ordinates have been approximated from GIS program

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 50.5 AHD
**COORDINATE:** E:334334.0, N:6254380.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH02
**PROJECT No:** 233796.00
**DATE:** 11/11/22 - 16/11/22
**SHEET:** 1 of 1




**0.65-24.95 m depth**

Generated with CORE-GS by Geroc - Combined Log - 11/03/2025 3:19:00 PM

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334328.0, N:6254395.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH03A
**PROJECT No:** 233796.00
**DATE:** 17/11/22 - 22/11/22
**SHEET:** 1 of 3

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL ORIGIN(#) | SOIL CONSIS.(†) DENSITY.(†) | SOIL MOISTURE | ROCK WEATH. | ROCK DEPTH (m) | ROCK STRENGTH | ROCK RECOVERY (%) | ROCK RQD | ROCK FRACTURE SPACING (m) | ROCK DEFECTS & REMARKS | SAMPLE REMARKS | SAMPLE TYPE | SAMPLE INTERVAL | TESTING DEPTH (m) | TESTING TEST TYPE | TESTING RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17/11/22 No free groundwater observed during augering | 55.68 | 0.12 | CONCRETE | | | | | | | | | | | | | | | | PID | PID= 3.9 ppmppm |
| | 55.50 | 0.30 | FILL/Gravelly SAND: fine to medium, dark grey-brown, medium to coarse, angular to sub-angular igneous gravel, moist | | | | | | | | | | | | | | | | | |
| | 55.15 | 0.65 | SAND: fine to coarse, pale orange-brown, with fine to medium sandstone gravel | | | | | | | | | | | | | | | | | |
| | 54.97 | 0.85 | SANDSTONE: pale yellow-grey, inferred very low to low strength | | | | | SW | 0.85 | L | | | | | | | | 1 | PLT | PL(A)=0.20MPa |
| | 54.85 | 1.00 | | | | | | | 1.30 | M | 74 | 64 | | | | | | | | |
| | 54.67 | 1.83 | SANDSTONE: medium to coarse grained, pale grey-yellow, medium strength with very low to low strength bands, slightly weathered, fractured, Hawkesbury Sandstone | | | | | | 1.70 | VL | | | | 1.70m: , B0-5°,pl,ro, cly vn<br>1.75m: , Ds, 80mm | | | | 2 | PLT | PL(A)=0.30MPa |
| | 54.50 | 2.00 | | | | | | | 2.16 | | | | | | | | | | | |
| | 54.34 | 2.16 | | | | | | SW | | | | | | 2.59m: , B0-5°,pl,ro, cly vn | | | | | | |
| | 53.00 | 3.00 | SANDSTONE: medium to coarse grained, pale grey-yellow then dark brown, medium then high strength, moderately to slightly weathered, unbroken, Hawkesbury Sandstone | | | | | | 2.80 | | 100 | 100 | | | | | | 3 | PLT | PL(A)=0.60MPa |
| | 52.00 | 4.00 | | | | | | | | M | 100 | 100 | | | | | | 4 | PLT | PL(A)=0.70MPa |
| | 51.00 | 5.00 | | | | | | | 5.20 | | 100 | 100 | | | | | | 5 | PLT | PL(A)=1.0MPa |
| | 50.00 | 6.00 | | | | | | MW | | | 100 | 100 | | | | | | 6 | PLT | PL(A)=1.0MPa |
| | 49.00 | 7.00 | | | | | | | | H | 100 | 100 | | | | | | 7 | PLT | PL(A)=1.6MPa |
| | 48.00 | 8.00 | 7.80m: Below 7.8m: Slightly fractured to unbroken | | | | | | 8.40 | | 100 | 98 | | 8.04m , 7.84-8.25m: J60-80°, pl, ro, fe stn<br>8.43m: , B 0-5°,pl,ro, cly vn | | | | 8 | PLT | PL(A)=1.2MPa |
| | 47.00 | 9.00 | | | | | | SW | | | | | | 9.53m , B0-5°,pl,he,fe stn<br>9.55m , B0-5°,pl,ro, cly vn / fe stn | | | | 9 | PLT | PL(A)=1.0MPa |
| | 46.00 | 10.00 | | | | | | | | | 100 | 100 | | | | | | | PLT | PL(A)=1.7MPa |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.12m, Solid Flight Auger (TC-bit) to 0.85m, NMLC coring to 21.90m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 21.90m (sump: 21.50 to 21.90, screen: 8.00m to 21.5m, Solid PVC 0.1m to 8.00m, Gravel 7.5m to 21.90m, Bentonite Backfill 6.5m to 7.5m, Gravel 0.1m to 6.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334328.0, N:6254395.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH03A
**PROJECT No:** 233796.00
**DATE:** 17/11/22 - 22/11/22
**SHEET:** 2 of 3

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | | | | | SAMPLE | | | | TESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SOIL | | | | ROCK | | | | | | | | | | | | | | | |
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS.(†) DENSITY.(†) | MOISTURE | WEATH. | DEPTH (m) | STRENGTH VL L M H VH EH | RECOVERY (%) | RQD | FRACTURE SPACING (m) 0.005 0.05 0.10 0.50 1.00 >1.00 | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| | 45 | 11 | [CONT] SANDSTONE: medium to coarse grained, pale grey-yellow then dark brown, medium then high strength, moderately to slightly weathered, unbroken, Hawkesbury Sandstone | | | | | SW | 10.80 | H | 100 | 100 | | 10.10m: , B 0-5°,pl,he,fe stn<br>10.99m: , B 0-5°,pl,he,fe stn | | | | 11 | PLT | PL(A)=1.6MPa |
| | 44 | 12 | | | | | | MW | | | 100 | 99 | | 11.39m: , B 0-5°,pl,he,fe stn<br>12.10m: , 12.10-12.11m: B(x2) 0-5°, pl, he, cly vnr | | | | 12 | PLT | PL(A)=1.5MPa |
| | 43 | 13 | | | | | | | | | 100 | 100 | | 13.06m: , B 0-5°,pl,he,fe stn<br>13.21m: , B 0-5°,pl,ro, cly vn | | | | 13 | PLT | PL(A)=1.3MPa |
| | 42 | 14 | 14.06 SANDSTONE: medium to coarse grained, pale grey, medium then high strength, fresh, slightly fractured to unbroken, Hawkesbury Sandstone | | | | | | 14.06 | M | | | | | | | | 14 | PLT | PL(A)=1.0MPa |
| | 41 | 15 | | | | | | | | | 100 | 97 | | 14.90m: , B 0-5°,pl,ro, cly vn<br>15.04m: , Cs, 40 mm | | | | 15 | PLT | PL(A)=0.70MPa |
| | 40 | 16 | | | | | | | 15.30 | | 100 | 98 | | 16.30m: , B 0-5°,pl,ro, cly vn | | | | 16 | PLT | PL(A)=1.8MPa |
| | 39 | 17 | | | | | | FR | | | | | | 16.85m: , Cs, 20 mm | | | | 17 | PLT | PL(A)=1.3MPa |
| | 38 | 18 | | | | | | | | H | 100 | 100 | | 17.99m: , B 0-5°,pl,ro, cly vn<br>18.10m: , B 0-5°,pl,ro, cly inf 5 mm<br>18.53m: , B 0-5°,pl,ro, cly vn | | | | 18 | PLT | PL(A)=2.0MPa |
| | 37 | 19 | 19.35m: 19.35-20.55m: moderately weathered | | | | | | 19.35 | | 100 | 97 | | 19.35m: , B 0-5°,pl,ro, fe stn | | | | 19 | PLT | PL(A)=2.0MPa |
| | 36 | | | | | | | MW | | | | | | | | | | | PLT | PL(A)=1.2MPa |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.12m, Solid Flight Auger (TC-bit) to 0.85m, NMLC coring to 21.90m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 21.90m (sump: 21.50 to 21.90, screen: 8.00m to 21.5m, Solid PVC 0.1m to 8.00m, Gravel 7.5m to 21.90m, Bentonite Backfill 6.5m to 7.5m, Gravel 0.1m to 6.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334328.0, N:6254395.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH03A
**PROJECT No:** 233796.00
**DATE:** 17/11/22 - 22/11/22
**SHEET:** 3 of 3

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | | | | | | SAMPLE | | | | TESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SOIL | | | | ROCK | | | | | | | | | | | | | | | | |
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS.(†) DENSITY.(†) | MOISTURE | WEATH. | DEPTH (m) | STRENGTH | | | | | | | RECOVERY (%) | RQD | FRACTURE SPACING (m) | | | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| | | | | | | | | | | VL | L | M | H | VH | EH | | | | >6.00 | 2.00-6.00 | 0.60-2.00 | 0.20-0.60 | <0.06 | | | | | | |
| | 35 | | [CONT] SANDSTONE: medium to coarse grained, pale grey, medium then high strength, fresh, slightly fractured to unbroken, Hawkesbury Sandstone | | | | | MW | | | | | | | | | 100 | 97 | | | | 20.28m: , B0-5°,pl,ro, cly vn | | | | | | |
| | | 21 | | | | | | | 20.55 | | | | | | | | | | | | | | | | | PLT | PL(A)=1.0MPa |
| | | | | | | | | FR | | | | | | | | | 100 | 93 | | | | 21.10m: , Cs, 10mm | | | | | | |
| | 34 | | | | | | | | | | | | | | | | | | | | | 21.45m: , B0-5°,pl,ro, cly vn | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | 21.81m: , J45°pl,ro,cly vn | | | | | | |
| | | 22 | Borehole discontinued at 21.90m depth. Target depth reached. | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 23 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | | | | | | | | | | | | | | | |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.12m, Solid Flight Auger (TC-bit) to 0.85m, NMLC coring to 21.90m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 21.90m (sump: 21.50 to 21.90, screen: 8.00m to 21.5m, Solid PVC 0.1m to 8.00m, Gravel 7.5m to 21.90m, Bentonite Backfill 6.5m to 7.5m, Gravel 0.1m to 6.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334328.0, N:6254395.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH03A
**PROJECT No:** 233796.00
**DATE:** 17/11/22 - 22/11/22
**SHEET:** 1 of 1




**0.85-21.90 m depth**

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Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334317.0, N:6254413.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH04
**PROJECT No:** 233796.00
**DATE:** 16/11/22 - 18/11/22
**SHEET:** 1 of 3

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | SOIL ORIGIN(#) | SOIL CONSIS.(†) DENSITY.(†) | SOIL MOISTURE | ROCK WEATH. | ROCK DEPTH (m) | ROCK STRENGTH | ROCK RECOVERY (%) | ROCK RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | SAMPLE TYPE | SAMPLE INTERVAL | DEPTH (m) | TESTING TEST TYPE | TESTING RESULTS AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16/11/22 No free groundwater observed during augering | 55 | 0.15 | CONCRETE | | | | | | | | | | | | | | | | PID | PID= 3.5 ppmppm |
| | | 0.30 | FILL/Gravelly SAND: fine to medium, dark grey-brown, medium to coarse, angular to sub-angular igneous gravel, moist | | | | | | | | | | | | | | | | PID | PID= 3.9 ppmppm |
| | | 0.55 | SANDSTONE: orange-brown, inferred very low to low strength | | | | | MW | 0.55 | | 100 | 100 | | | | | | | | |
| | 54 | 1 | SANDSTONE: medium to coarse grained, red-brown then pale grey, medium strength, moderately then slightly weathered, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | | | | | 1 | PLT | PL(A)=0.70MPa |
| | | 2 | | | | | | | 2.20 | H | 100 | 100 | | 2.43m: , B0-5°,pl,ro,cly vn<br>2.62m: , B0-5°,pl,ro,cly inf 5 mm | | | | 2 | PLT | PL(A)=0.80MPa |
| | 53 | 3 | | | | | | FR | | | 100 | 100 | | | | | | 3 | PLT | PL(A)=0.70MPa |
| | | 3.43 | CORE LOSS | | | | | | 3.50 | | | | | | | | | | | |
| | 52 | 3.50 | SANDSTONE: medium to coarse grained, pale grey-yellow and dark brown, high strength, moderately weathered then fresh, slightly fractured then unbroken, Hawkesbury Sandstone | | | | | | | | 93 | 93 | | | | | | | | |
| | | 4 | 4.30m: 4.30-4.32m: quartz clasts to 5 mm | | | | | SW | | | | | | | | | | 4 | PLT | PL(A)=1.8MPa |
| | 51 | 5 | | | | | | | 5.00 | | 100 | 100 | | 4.75m: , B0-5°,pl,ro,cly vn | | | | 5 | PLT | PL(A)=1.8MPa |
| | | | | | | | | FR | | | | | | | | | | | | |
| | 50 | 6 | | | | | | MW | 5.70 | | 100 | 100 | | 5.70m: , B0-5°,pl,he,cly vn | | | | 6 | PLT | PL(A)=1.5MPa |
| | | | | | | | | | 6.20 | | | | | | | | | | | |
| | 49 | 7 | | | | | | | | H | 100 | 100 | | | | | | 7 | PLT | PL(A)=1.4MPa |
| | 48 | 8 | | | | | | SW | | | 100 | 100 | | | | | | 8 | PLT | PL(A)=1.7MPa |
| | 47 | 9 | | | | | | | | | 100 | 100 | | | | | | 9 | PLT | PL(A)=1.9MPa |
| | 46 | | | | | | | | | | 100 | 100 | | | | | | | PLT | PL(A)=1.0MPa |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.55m, NMLC coring to 22.48m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 22.48m (sump: 22.00 to 22.48, screen: 7.00m to 22.0m, Solid PVC 0.1m to 7.00m, Gravel 6.5m to 22.48m, Bentonite Backfill 5.5m to 6.5m, Gravel 0.1m to 5.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Combined Log

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334317.0, N:6254413.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH04
**PROJECT No:** 233796.00
**DATE:** 16/11/22 - 18/11/22
**SHEET:** 2 of 3

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | | | | | | | SAMPLE | | | | TESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SOIL | | | ROCK | | | | | | | | | | | | | | | | | | |
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS.(†) DENSITY.(†) | MOISTURE | WEATH. | DEPTH (m) | STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| | 45 | 11 | [CONT] SANDSTONE: medium to coarse grained, pale grey-yellow and dark brown, high strength, moderately weathered then fresh, slightly fractured then unbroken, Hawkesbury Sandstone | | | | | SW | | H | 100 | 100 | | | | | | 11 | PLT | PL(A)=2.0MPa |
| | 44 | 12 | | | | | | | 11.30 | | 100 | 100 | | | | | | 12 | PLT | PL(A)=2.0MPa |
| | | 12.06 | | | | | | MW | | | 100 | 97 | | 12.13m: , B0-5°,pl,ro,cly vn<br>12.35m: , B0-5°,pl,he,cly vn<br>12.38m: , B0-5°,pl,he,cly vn | | | | | | |
| | 43 | 13 | SANDSTONE: medium to coarse grained, pale grey, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | 12.06<br>12.12 | M | 100 | 94 | | 13.05m: , B0-5°,pl,he,cly vn<br>13.08m: , Ds, 20 mm | | | | 13 | PLT | PL(A)=0.40MPa |
| | 42 | 14 | | | | | | | 13.10 | | 100 | 100 | | | | | | 14 | PLT | PL(A)=1.7MPa |
| | 41 | 15 | | | | | | | | | 100 | 100 | | | | | | 15 | PLT | PL(A)=1.5MPa |
| | 40 | 16 | | | | | | FR | | | 100 | 100 | | | | | | 16 | PLT | PL(A)=1.4MPa |
| | 39 | 17 | 17.63m: 17.63-17.65m: fine to medium grained, dark grey | | | | | | | H | 100 | 100 | | | | | | 17 | PLT | PL(A)=2.0MPa |
| | 38 | 18 | | | | | | | | | 100 | 100 | | | | | | 18 | PLT | PL(A)=1.6MPa |
| | 37 | 19 | | | | | | | | | 100 | 100 | | | | | | 19 | PLT | PL(A)=1.6MPa |
| | 36 | | | | | | | | | | 100 | 100 | | | | | | | PLT | PL(A)=2.3MPa |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.55m, NMLC coring to 22.48m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 22.48m (sump: 22.00 to 22.48, screen: 7.00m to 22.0m, Solid PVC 0.1m to 7.00m, Gravel 6.5m to 22.48m, Bentonite Backfill 5.5m to 6.5m, Gravel 0.1m to 5.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334317.0, N:6254413.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH04
**PROJECT No:** 233796.00
**DATE:** 16/11/22 - 18/11/22
**SHEET:** 3 of 3

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | | | | | SAMPLE | | | | TESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SOIL | | | ROCK | | | | | | | | | | | | | | | | |
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS.(†) DENSITY.(†) | MOISTURE | WEATH. | DEPTH (m) | STRENGTH (VL L M H VH EH) | RECOVERY (%) | RQD | FRACTURE SPACING (m) (>0.6 0.6-0.2 0.2-0.06 0.06-0.02 <0.02) | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| | 35 | 21 | [CONT] SANDSTONE: medium to coarse grained, pale grey, medium then high strength, fresh, unbroken, Hawkesbury Sandstone | | | | | | | | 100 | 100 | | | | | | 21 | PLT | PL(A)=1.0MPa |
| | 34 | 22 | 21.15m: 21.15-21.39m: siltstone band | | | | | FR | | H | 100 | 100 | | | | | | 22 | PLT | PL(A)=1.1MPa |
| | | | | | | | | | | | | | | | | | | | PLT | PL(A)=1.2MPa |
| | | 23 | Borehole discontinued at 22.48m depth. Target depth reached. | | | | | | | | | | | | | | | | | |
| | | 24 | | | | | | | | | | | | | | | | | | |
| | | 25 | | | | | | | | | | | | | | | | | | |
| | | 26 | | | | | | | | | | | | | | | | | | |
| | | 27 | | | | | | | | | | | | | | | | | | |
| | | 28 | | | | | | | | | | | | | | | | | | |
| | | 29 | | | | | | | | | | | | | | | | | | |

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:** DP710P
**OPERATOR:** BS
**LOGGED:** YB
**METHOD:** Diacore to 0.15m, Solid Flight Auger (TC-bit) to 0.55m, NMLC coring to 22.48m. HW to 0.9 m.
**CASING:** Uncased
**REMARKS:** Standpipe installed to 22.48m (sump: 22.00 to 22.48, screen: 7.00m to 22.0m, Solid PVC 0.1m to 7.00m, Gravel 6.5m to 22.48m, Bentonite Backfill 5.5m to 6.5m, Gravel 0.1m to 5.5m, Gatic Cover at top). BH co-

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Generated with CORE-GS by Geroc - Combined Log

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 55.8 AHD
**COORDINATE:** E:334317.0, N:6254413.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH04
**PROJECT No:** 233796.00
**DATE:** 16/11/22 - 18/11/22
**SHEET:** 1 of 1




**0.55-22.48 m depth**

Generated with CORE-GS by Geroc - Combined Log - 11/03/2025 3:19:09 PM

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 1 of 7

| 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 |
| | 56 | 0.05 | ASPHALTIC CONCRETE. | | NA | | | | | | | | | Bentonite | Gravel |
| | | 0.15 | CONCRETE. | | FILL | ND | | | | | | | | | |
| | | 0.50 | FILL / Gravelly CLAY: pale brown; rounded gravel; 5mm-20mm diameter. | | | | | | | | | | | | |
| | 55 | 1 | SANDSTONE: orange-brown, red-brown. Hawkesbury Sandstone. | | | (VL) | ND | | | | 1 | | | | |
| | | 1.60 | Continued as rock log | | | | | | | | | | | | |
| | 54 | 2 | | | | | | | | | 2 | | | | |
| | 53 | 3 | | | | | | | | | 3 | | | | |
| | 52 | 4 | | | | | | | | | 4 | | | | |
| | 51 | 5 | | | | | | | | | 5 | | | | |
| | 50 | 6 | | | | | | | | | 6 | | | | |
| | 49 | 7 | | | | | | | | | 7 | | | | |
| | 48 | 8 | | | | | | | | | 8 | | | | |
| | 47 | 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:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

Refer to explanatory notes for symbol and abbreviation definitions

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

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 2 of 7

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Continued from soil log | | | | | | | | | | | | | | | | |
| | | | SANDSTONE: brown, red-brown, medium to coarse grained, bedded, 0 to 20°; 0-20% iron-indurated bands. Hawkesbury Sandstone. | | HW | 1.60 | VL | 100 | 88 | | 1.63m: B, 0°, PR, INF Clay 20mm, SM | | | | | PLT | PL(A)=0.05MPa | Bentonite | |
| | | | | | XW | 1.75 | SEAM | | | SEAM | 1.75-1.83m: EW, 80mm | | | | | PP | 260kPa | | |
| | | | | | | 1.83 | | | | | 1.90m: B, 0°, PR, Clay, RF | | | | | PLT | PL(A)=0.75MPa | | |
| | | | | | HW | | | | | | | | | | | PLT | PL(A)=0.64MPa | | |
| | | | | | | 3.40 | M | | | | | | | | | PLT | PL(A)=1.1MPa | | |
| | | | | | | | | 100 | 100 | | 4.66m: B, 0°, PR, VNR Clay, SM | | | | | PLT | PL(A)=0.74MPa | | |
| | | | | | MW | | | | | | 5.27m: B, 0°, PR, CN, SM | | | | | PLT | PL(A)=0.39MPa | | |
| | | | | | | | | | | | 5.43m: B, 10°, PR, CN, SM | | | | | | | Gravel | |
| | | | | | | | | | | | 5.63m: JT, 30°, PR, CN, RF | | | | | PLT | PL(A)=0.41MPa | | |
| | | | 6.15m: becoming pale brown and pale red-brown | | | 6.15 | | | | | 6.15m: B, 0°, PR, CN, RF | | | | | | | | |
| | | | From 7.50m: becoming pale grey | | | | H | 100 | 100 | | | | | | | PLT | PL(A)=1.2MPa | | |
| | | | | | SW | 7.80 | | | | | | | | | | PLT | PL(A)=1.2MPa | | |
| | | | | | | | | | | | | | | | | PLT | PL(A)=1.3MPa | | |
| | | | | | | 9.33 | M | | | | 9.33m: B, 5°, PR, SN Fe, SM | | | | | PLT | PL(A)=0.89MPa | | |
| | | | | | | | H | 100 | 100 | | | | | | | PLT | PL(A)=0.71MPa | | |

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

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

**PLANT:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 3 of 7

**CONDITIONS ENCOUNTERED**

| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA | SOIL STRENGTH (where encountered) / SOIL MOISTURE | GRAPHIC | WEATH. | DEPTH (m) | STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 46 | 10 | [CONT] SANDSTONE: brown, red-brown, medium to coarse grained, bedded, 0 to 20°; 0-20% iron-indurated bands. Hawkesbury Sandstone. | | | SW | 10.25 | M, H | | | | |
| | 45 | 11 | | | | | | | 100 | 100 | | |
| | | | 11.80m: becoming purple-brown | | | | 11.70 | H | | | | 11.65m: B, 0°, PR, VNR Clay, SM |
| | 44 | 12 | | | | MW | | | | | | 12.25m: B, 0°, PR, CN, RF |
| | | | 12.80m: becoming red-brown | | | | | | | | | 12.78m: B, 0-5°, CU, CT Clay 2mm, RF |
| | 43 | 13 | | | | | | | 100 | 100 | | |
| | | | | | | | | | | | | 13.71m: B, 0°, PR, SN Fe, SM |
| | | 14 | | | | | | | | | | |
| | | 14.18 | SANDSTONE: pale grey, medium to coarse grained, bedded, 0 to 20°; cross-bedding. Hawkesbury Sandstone. | | | | 14.18 | | | | | 14.35m: B, 10°, PR, CN, RF |
| | 42 | 15 | | | | | | | | | | |
| | 41 | | | | | | | M, H | 100 | 100 | | |
| | | 16 | | | | FR | | | | | | 16.00m: B, 5°, PR, VNR Clay, SM |
| | 40 | | | | | | | | | | | |
| | | 17 | | | | | 17.50 | | | | | |
| | 39 | | | | | | | | 100 | 100 | | |
| | | 18 | | | | | | | | | | 18.58m: B, 0°, PR, VNR Clay, SM |
| | 38 | | | | | | | H | | | | |
| | | 18.96 | SANDSTONE: red-brown, medium to coarse grained, bedded, 0 to 20°; iron-indurated. Hawkesbury Sandstone. | | | | 18.96 | | | | | |
| | 37 | | | | | HW | | | 100 | 100 | | 19.71m: B, 0°, PR, CN, SM |

**SAMPLE**

| DEPTH (m) | SAMPLE REMARKS | TYPE | INTERVAL |
|---|---|---|---|
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |

**TESTING**

| TEST TYPE | RESULTS AND REMARKS |
|---|---|
| PLT | PL(A)=1.1MPa |
| PLT | PL(A)=1.2MPa |
| PLT | PL(A)=1.7MPa |
| PLT | PL(A)=1.3MPa |
| PLT | PL(A)=1.3MPa |
| PLT | PL(A)=0.84MPa |
| PLT | PL(A)=1.5MPa |
| PLT | PL(A)=0.94MPa |
| PLT | PL(A)=1.4MPa |
| PLT | PL(A)=1.2MPa |
| PLT | PL(A)=2.6MPa |
| PLT | PL(A)=2.4MPa |

BACKFILL: Gravel; Bentonite
WELL PIPE

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

**PLANT:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 4 of 7

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 36 | 20.28 | [CONT] SANDSTONE: red-brown, medium to coarse grained, bedded, 0 to 20°; iron-indurated. Hawkesbury Sandstone. | | HW | 20.34 | | 100 | 100 | | | | | | 21 | PLT | PL(A)=1.8MPa | Bentonite | |
| | 35 | 21 | SANDSTONE: pale grey, medium to coarse grained, bedded, 0 to 20°; cross-bedding. Hawkesbury Sandstone. | | | | H | 100 | 100 | | | | | | 22 | PLT | PL(A)=1.5MPa | | |
| | 34 | 22 | | | | 22.46 | | | | | | | | | 23 | PLT | PL(A)=0.76MPa | | |
| | | 22.55 | SANDSTONE: pale grey, medium to coarse grained, massive. Hawkesbury Sandstone. | | | 22.52 | | | | | | | | | | PLT | PL(A)=1.2MPa | | |
| | 33 | 23 | | | | | | | | | | | | | 24 | PLT | PL(A)=1.3MPa | | |
| | 32 | 24 | | | | | | 100 | 100 | | | | | | | | | | |
| | 31 | 25 | 24.96m-26.58m: occasional siltstone and quartz clast | | FR | | | 100 | 100 | | | | | | 25 | PLT | PL(A)=1.6MPa | Gravel | |
| | | 26 | | | | | H | | | | | | | | | PLT | PL(A)=2.4MPa | | |
| | 30 | | | | | | | | | | | | | | 26 | PLT | PL(A)=1.9MPa | | |
| | | 27 | | | | | | | | | 27.42m: B, 0°, PR, VNR Clay, SM | | | | | PLT | PL(A)=1.8MPa | | |
| | 29 | | | | | | | | | | | | | | 27 | PLT | PL(A)=3.2MPa | | |
| | | 28 | | | | | | | | | | | | | | PLT | PL(A)=1.7MPa | | |
| | 28 | | 28.50m-28.54m: siltstone band | | | | | 100 | 94 | | 28.52m: B, 15°, PR, CN, RF<br>28.56m: B, 0°, UN, CN, RF | | | | 28 | PLT | PL(A)=1.4MPa | | |
| | | 29 | 29.12m-29.18m: siltstone band | | | | | | | | 29.12m: B, 0°, PR, CN, RF<br>29.17m: B, 15°, PR, CN, VR | | | | | | | | |
| | 27 | 29.18 | SANDSTONE: pale grey, medium to coarse grained, bedded, 0 to 20°; cross-bedding. Hawkesbury Sandstone. | | | | | | | | | | | | 29 | PLT | PL(A)=2.2MPa | | |
| | | | | | | | | | | | | | | | | PLT | PL(A)=1.5MPa | | |

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

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

**PLANT:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

Refer to explanatory notes for symbol and abbreviation definitions

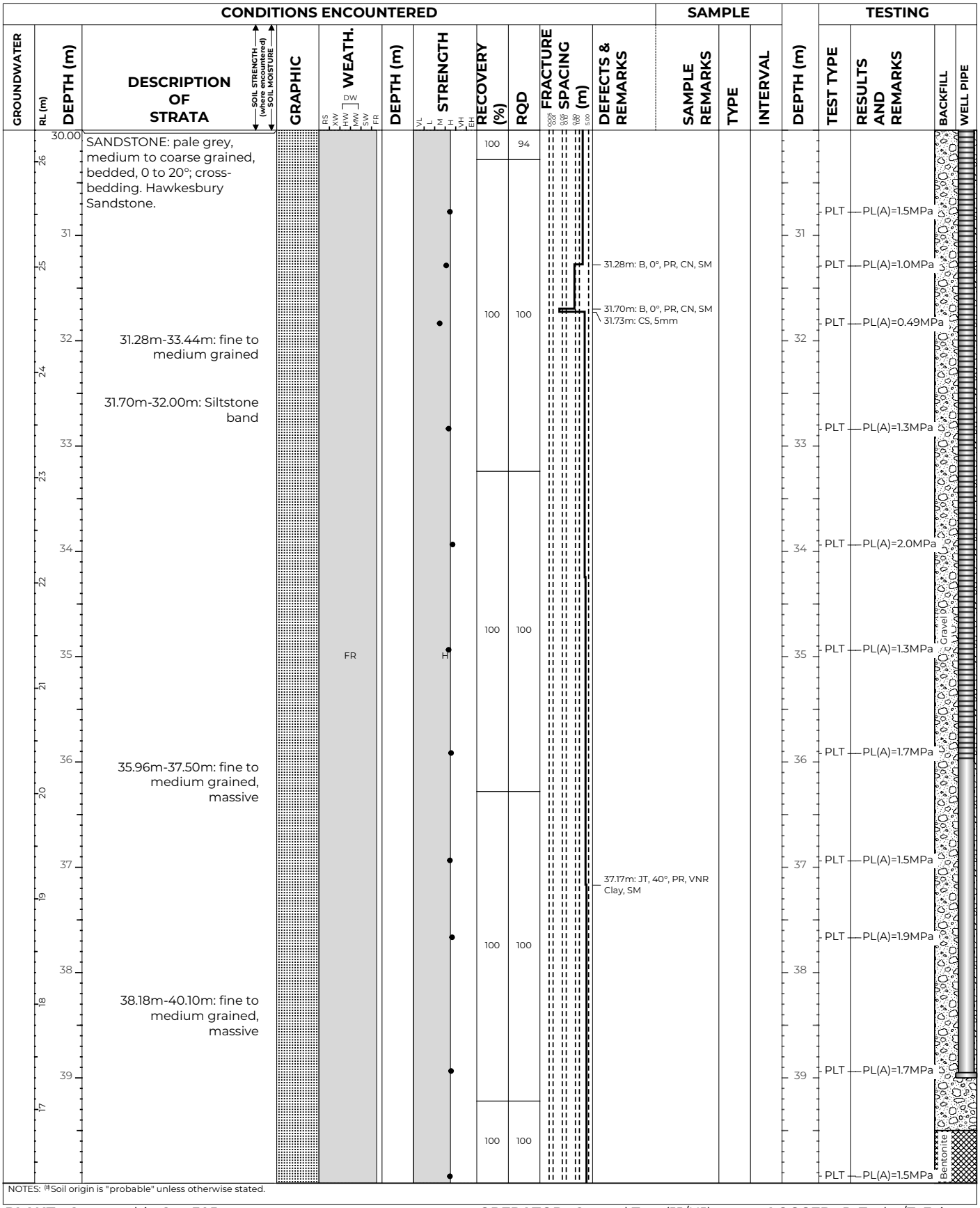
Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 5 of 7




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

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

**PLANT:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

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Douglas PARTNERS

# BOREHOLE LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
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**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

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**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 6 of 7

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 41 | [CONT] SANDSTONE: pale grey, medium to coarse grained, bedded, 0 to 20°; cross-bedding. Hawkesbury Sandstone. | | | | | | | | 40.63m: , siltstone clasts | | | | 41 | PLT | PL(A)=1.5MPa | Bentonite | |
| | 15 | | | | | | | 100 | 100 | | 41.13m: B, 0°, PR, VNR Clay, SM | | | | | | | | |
| | | | | | | | | | | | 41.51m: B, 0°, PR, CN, VR | | | | | | | | |
| | 14 | 42 | | | | | | | | | | | | | 42 | PLT | PL(A)=1.4MPa | | |
| | | 43 | | | | | | | | | | | | | 43 | PLT | PL(A)=1.4MPa | | |
| | 13 | | | | | | | | | | 43.16m: B, 5°, PR, VNR Clay, SM | | | | | PLT | PL(A)=2.2MPa | | |
| | | | | | | | | 100 | 100 | | | | | | | | | | |
| | 12 | 44 | | | | | | | | | | | | | 44 | PLT | PL(A)=2.5MPa | | |
| | | 45 | | | FR | | H | | | | | | | | 45 | PLT | PL(A)=1.8MPa | Gravel | |
| | 11 | | | | | | | | | | | | | | | PLT | PL(A)=2.3MPa | | |
| | | | 45.66m-45.97m: Partial shale band | | | | | | | | 45.66-45.97m: JT, 85-90°, IR, CN, VR | | | | | | | | |
| | | 46 | | | | | | | | | | | | | 46 | PLT | PL(A)=2.2MPa | | |
| | 10 | | 46.55m-47.55m: fine to medium grained, massive | | | | | 100 | 95 | | | | | | | | | | |
| | | 47 | | | | | | | | | | | | | 47 | PLT | PL(A)=2.4MPa | | |
| | 9 | | | | | | | | | | | | | | | | | | |
| | | 48 | | | | | | | | | 47.92m: , siltstone clasts | | | | 48 | PLT | PL(A)=1.5MPa | | |
| | 8 | | | | | | | | | | | | | | | | | | |
| | | 49 | | | | | | 100 | 100 | | 49.35m: B, 10°, PR, VNR Clay, SM | | | | 49 | PLT | PL(A)=1.8MPa | | |
| | 7 | | | | | | | | | | | | | | | | | | |

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

**PLANT:** Commachio Geo 305
**OPERATOR:** Ground Test (JJ/HJ)
**LOGGED:** R. Taylor/Z. Faiz
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**CASING:** HWT to 1.55m
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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

# BOREHOLE LOG

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**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 7 of 7

| CONDITIONS ENCOUNTERED | | | | | | | | | | | | | | SAMPLE | | | | TESTING | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE) | GRAPHIC | WEATH. (PS, XW, HW, DW, MW, SW, FR) | DEPTH (m) | STRENGTH (VL, L, M, H, VH, EH) | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE |
| | 6 | 0 | [CONT] SANDSTONE: pale grey, medium to coarse grained, bedded, 0 to 20°; cross-bedding. Hawkesbury Sandstone. | | FR | | H | 100 | 100 | | | | | | | PLT | PL(A)=1.3MPa | Gravel | |
| | 5 | 1 | Borehole discontinued at 50.25m depth. Target depth reached. | | | | | | | | | | | | | | | | |
| | 4 | 2 | | | | | | | | | | | | | | | | | |
| | 3 | 3 | | | | | | | | | | | | | | | | | |
| | 2 | 4 | | | | | | | | | | | | | | | | | |
| | 1 | 5 | | | | | | | | | | | | | | | | | |
| | 0 | 6 | | | | | | | | | | | | | | | | | |
| | -1 | 7 | | | | | | | | | | | | | | | | | |
| | -2 | 8 | | | | | | | | | | | | | | | | | |
| | -3 | 9 | | | | | | | | | | | | | | | | | |

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

**PLANT:** Commachio Geo 305
**METHOD:** DT to 0.15m, NDD to 1.6m, HQ to 50.25
**REMARKS:** Subsurface conditions based on side wall observations of non destructive drilling excavation to 1.6m

**OPERATOR:** Ground Test (JJ/HJ)

**LOGGED:** R. Taylor/Z. Faiz
**CASING:** HWT to 1.55m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
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**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 1 of 7




**1.60-5.00 m depth**




**5.00-9.00 m depth**

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

# CORE PHOTO LOG

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**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 2 of 7




**9.00-13.00 m depth**




**13.00-17.00 m depth**

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

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 3 of 7




**17.00-21.00 m depth**




**21.00-25.00 m depth**

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

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 4 of 7




**25.00-29.00 m depth**




**29.00-33.00 m depth**

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

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
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**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 5 of 7




**33.00-37.00 m depth**




**37.00-41.00 m depth**

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

# CORE PHOTO LOG

**CLIENT:** Freecity Group Holdings Pty Ltd
**PROJECT:** Proposed Mixed Use Development
**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
**COORDINATE:** E:334347.0, N:6254399.0
**DATUM/GRID:** MGA2020 Zone 56
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**LOCATION ID:** BH201
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**DATE:** 07/08/25 - 12/08/25
**SHEET:** 6 of 7




**41.00-45.00 m depth**




**45.00-49.00 m depth**

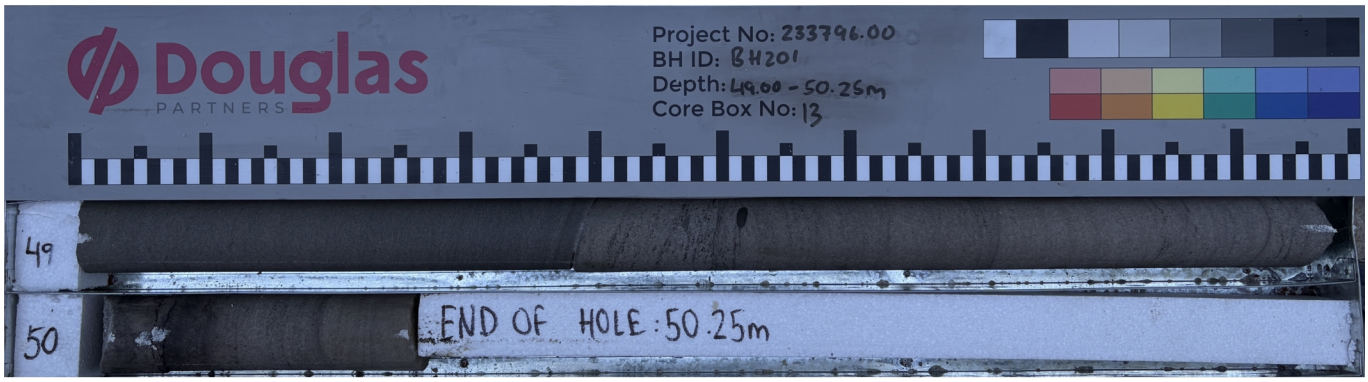
Generated with CORE-GS by Geroc - Split Soil-Rock Log

# CORE PHOTO LOG

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**LOCATION:** 153 Walker Street, North Sydney, NSW 2060

**SURFACE LEVEL:** 56.3 AHD
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**DATUM/GRID:** MGA2020 Zone 56
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH201
**PROJECT No:** 233796.00
**DATE:** 07/08/25 - 12/08/25
**SHEET:** 7 of 7




**49.00-50.25 m depth**

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

## Appendix D

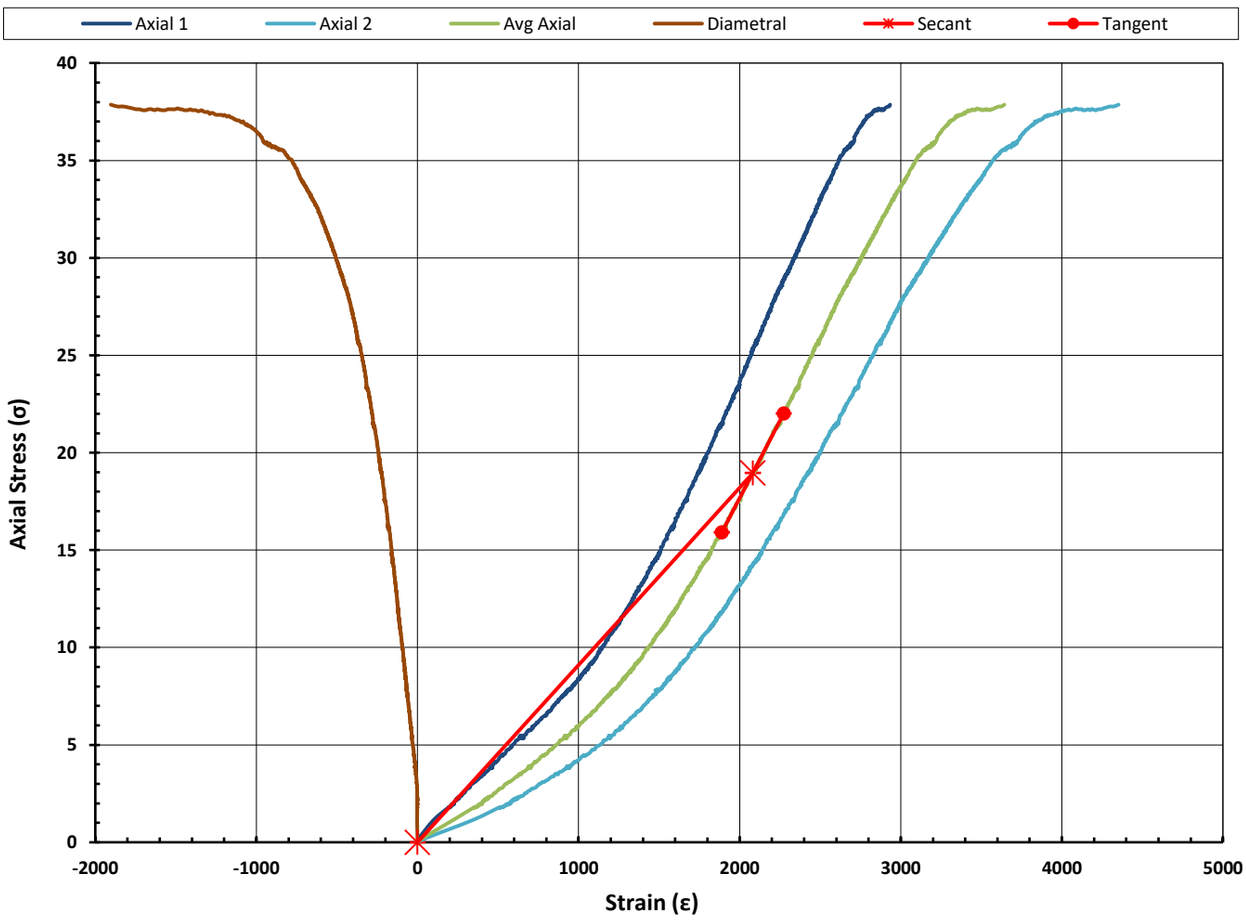
Laboratory Results

# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH01 12.24-12.50m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82460-MOD |
| **Job #** | S22145-1 | **Sample #** | S82460 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

## Axial Stress vs Strain Plots




**Uniaxial Compressive Strength** **38** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 16 GPa | 0.12 | from 42 % to 58 % of Max UCS |
| Secant | 9.1 GPa | 0.11 | from 0 % to 50 % of Max UCS |

**Notes**

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**NATA Accredited Laboratory Number: 14874**

Authorised Signatory:

Chris Lloyd

Date: 28/11/2022


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14 Carter Street
Lidcombe NSW 2141

# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH01 12.24-12.50m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82460-MOD |
| **Job #** | S22145-1 | **Sample #** | S82460 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

| | | | |
|---|---|---|---|
| **Average Specimen Diameter (mm)** | 51.7 | **Moisture Content (%)** | 6.6 |
| **Average Specimen Height (mm)** | 147.2 | **Wet Density (t/m$^3$)** | 2.38 |
| **Length to Diameter Ratio** | 2.8 | **Dry Density (t/m$^3$)** | 2.24 |
| **Duration of Test (min)** | 15.88 | **Rate of Displacement (mm/min):** | < 0.1 |
| **Date of Test:** | 25/11/22 | **Specimen Curing** | - |
| **Mode of Failure** | Mixed mode | **Test Apparatus** | Matest Compression Machine with Axial and Circumferential Extensometers. |



Before Test



After Test

**Uniaxial Compressive Strength** **38** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 16 GPa | 0.12 | from 42 % to 58 % of Max UCS |
| Secant | 9.1 GPa | 0.11 | from 0 % to 50 % of Max UCS |

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Date: 28/11/2022

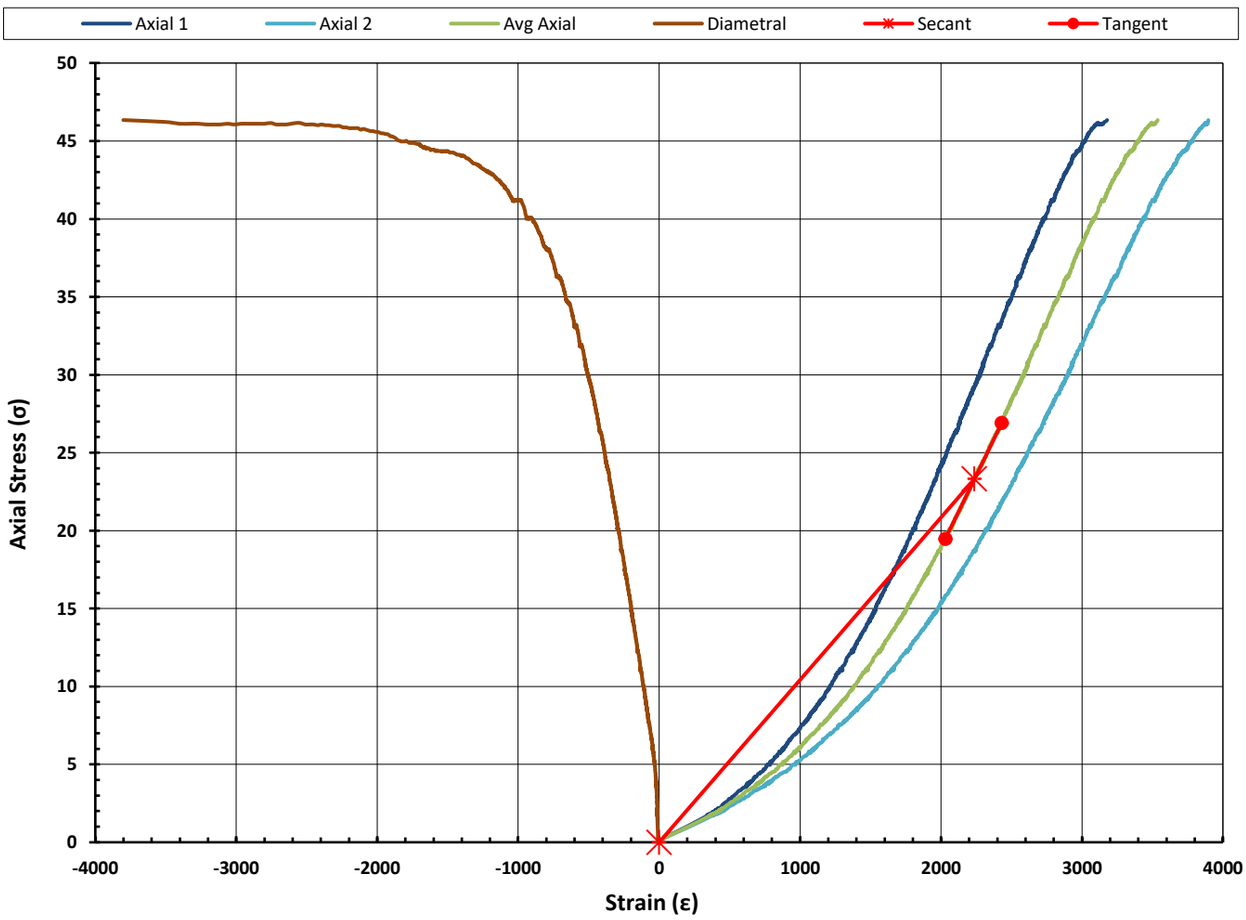
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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH02 21.07-21.35m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82461-MOD |
| **Job #** | S22145-1 | **Sample #** | S82461 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

## Axial Stress vs Strain Plots




**Uniaxial Compressive Strength** **46** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 19 GPa | 0.18 | from 42 % to 58 % of Max UCS |
| Secant | 10 GPa | 0.16 | from 0 % to 50 % of Max UCS |

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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH02 21.07-21.35m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82461-MOD |
| **Job #** | S22145-1 | **Sample #** | S82461 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

| | | | |
|---|---|---|---|
| **Average Specimen Diameter (mm)** | 51.8 | **Moisture Content (%)** | 6.2 |
| **Average Specimen Height (mm)** | 146.6 | **Wet Density (t/m$^3$)** | 2.39 |
| **Length to Diameter Ratio** | 2.8 | **Dry Density (t/m$^3$)** | 2.25 |
| **Duration of Test (min)** | 19.77 | **Rate of Displacement (mm/min):** | < 0.1 |
| **Date of Test:** | 25/11/22 | **Specimen Curing** | - |
| **Mode of Failure** | Single shear plane | **Test Apparatus** | Matest Compression Machine with Axial and Circumferential Extensometers. |



Before Test



After Test

**Uniaxial Compressive Strength** **46** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 19 GPa | 0.18 | from 42 % to 58 % of Max UCS |
| Secant | 10 GPa | 0.16 | from 0 % to 50 % of Max UCS |

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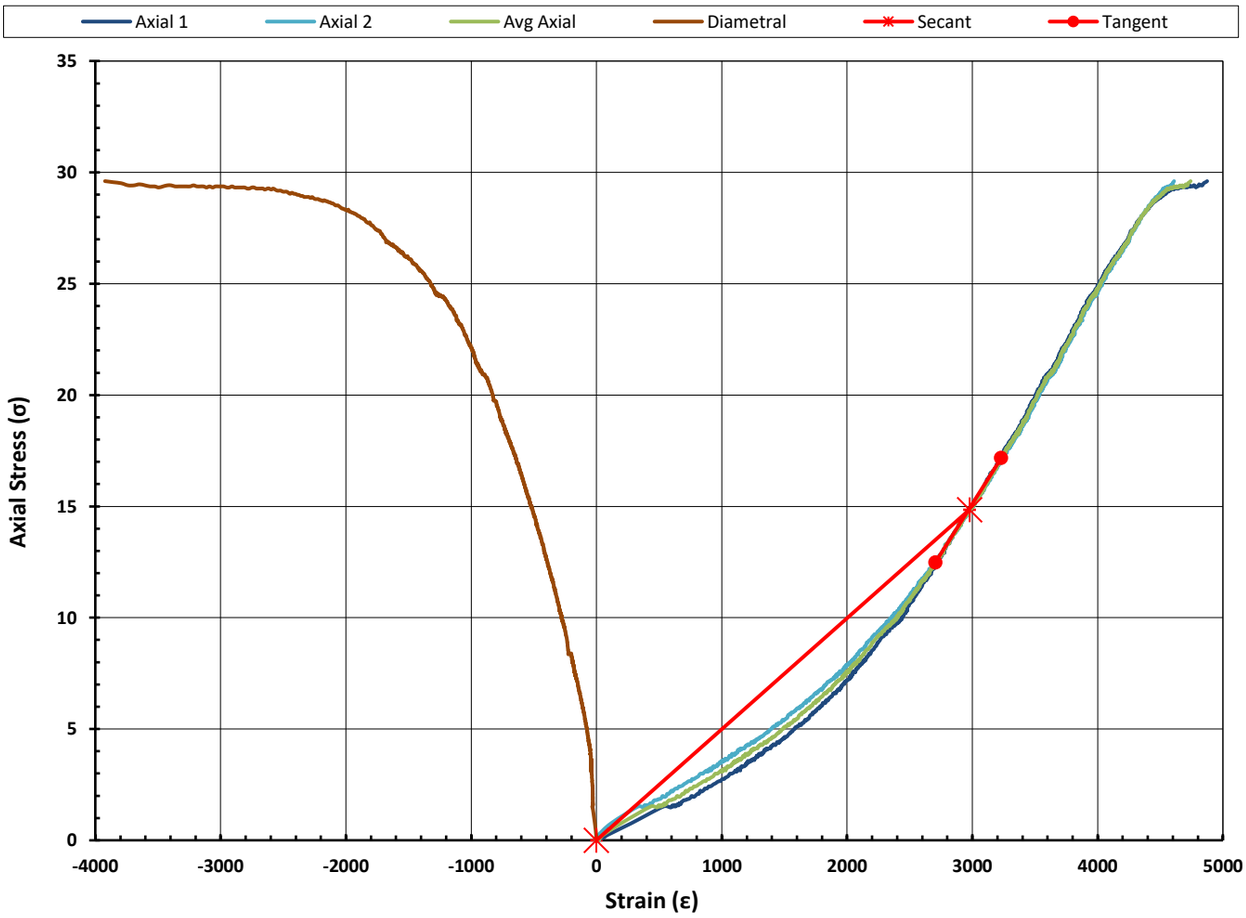
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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH03A 15.50-15.81m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82462-MOD |
| **Job #** | S22145-1 | **Sample #** | S82462 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

## Axial Stress vs Strain Plots




**Uniaxial Compressive Strength** **30** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 8.9 GPa | 0.20 | from 42 % to 58 % of Max UCS |
| Secant | 5.0 GPa | 0.17 | from 0 % to 50 % of Max UCS |

**Notes**

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Authorised Signatory:

Chris Lloyd

Date: 28/11/2022


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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH03A 15.50-15.81m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82462-MOD |
| **Job #** | S22145-1 | **Sample #** | S82462 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

| | | | |
|---|---|---|---|
| **Average Specimen Diameter (mm)** | 51.8 | **Moisture Content (%)** | 7.5 |
| **Average Specimen Height (mm)** | 148.2 | **Wet Density (t/m$^3$)** | 2.35 |
| **Length to Diameter Ratio** | 2.9 | **Dry Density (t/m$^3$)** | 2.19 |
| **Duration of Test (min)** | 12.58 | **Rate of Displacement (mm/min):** | < 0.1 |
| **Date of Test:** | 25/11/22 | **Specimen Curing** | - |
| **Mode of Failure** | Single shear plane | **Test Apparatus** | Matest Compression Machine with Axial and Circumferential Extensometers. |



Before Test



After Test

**Uniaxial Compressive Strength** **30** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 8.9 GPa | 0.20 | from 42 % to 58 % of Max UCS |
| Secant | 5.0 GPa | 0.17 | from 0 % to 50 % of Max UCS |

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Date: 28/11/2022

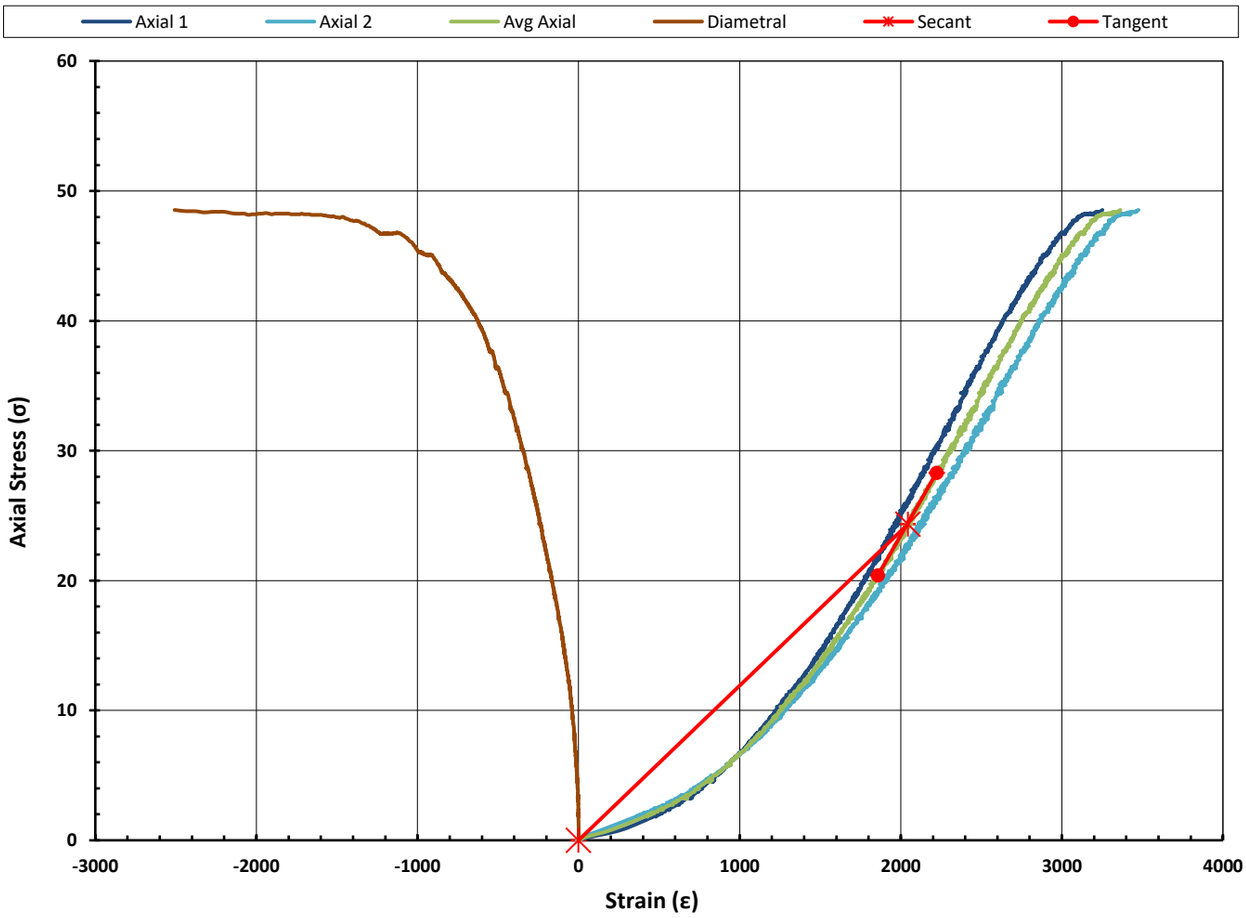
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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH04 3.50-3.80m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82463-MOD |
| **Job #** | S22145-1 | **Sample #** | S82463 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

## Axial Stress vs Strain Plots




**Uniaxial Compressive Strength** **49** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 22 GPa | 0.14 | from 42 % to 58 % of Max UCS |
| Secant | 12 GPa | 0.12 | from 0 % to 50 % of Max UCS |

**Notes**

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Authorised Signatory:

Chris Lloyd

Date: 29/11/2022


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# Deformability of Rock Materials in Uniaxial Compression

| | | | |
|---|---|---|---|
| **Client** | Douglas Partners | **Sample Source** | BH04 3.50-3.80m |
| **Address** | PO Box 472 West Ryde NSW 1685 | **Sample Description** | Sandstone |
| **Project** | NORTH SYDNEY (217311 00) | **Report #** | S82463-MOD |
| **Job #** | S22145-1 | **Sample #** | S82463 |

| | | | |
|---|---|---|---|
| **Test Procedure** | AS 4133.4.3.2 Deformability of rock materials in uniaxial compression-Rock strength less than 50 MPa | | |
| **Sampling** | Sampled by Client - results apply to the sample as received | **Date Sampled** | 24/11/2022 |
| **Storage History** | Sealed | **Storage Environment** | Sealed at as received moisture condition |

| | | | |
|---|---|---|---|
| **Average Specimen Diameter (mm)** | 51.7 | **Moisture Content (%)** | 4.5 |
| **Average Specimen Height (mm)** | 147.1 | **Wet Density (t/m$^3$)** | 2.34 |
| **Length to Diameter Ratio** | 2.8 | **Dry Density (t/m$^3$)** | 2.24 |
| **Duration of Test (min)** | 20.62 | **Rate of Displacement (mm/min):** | < 0.1 |
| **Date of Test:** | 25/11/22 | **Specimen Curing** | - |
| **Mode of Failure** | Mixed mode | **Test Apparatus** | Matest Compression Machine with Axial and Circumferential Extensometers. |



Before Test



After Test

**Uniaxial Compressive Strength** **49** **MPa**

| | Young's Modulus | Poisson's Ratio | |
|---|---|---|---|
| Tangent | 22 GPa | 0.14 | from 42 % to 58 % of Max UCS |
| Secant | 12 GPa | 0.12 | from 0 % to 50 % of Max UCS |

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Authorised Signatory:

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Date: 29/11/2022

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

# CERTIFICATE OF ANALYSIS 311626

## Client Details

| | |
|---|---|
| **Client** | Douglas Partners Pty Ltd |
| **Attention** | James Connaughton |
| **Address** | 96 Hermitage Rd, West Ryde, NSW, 2114 |

## Sample Details

| | |
|---|---|
| **Your Reference** | **217311.00, North Sydney, 153-157 Walker St** |
| **Number of Samples** | 3 Water |
| **Date samples received** | 25/11/2022 |
| **Date completed instructions received** | 28/11/2022 |

## Analysis Details

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

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

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

## Report Details

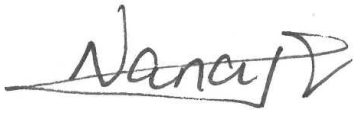
| | |
|---|---|
| **Date results requested by** | 29/11/2022 |
| **Date of Issue** | 29/11/2022 |

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**Results Approved By**
Diego Bigolin, Inorganics Supervisor

**Authorised By**



Nancy Zhang, Laboratory Manager

| Miscellaneous Inorganics | | | | |
|---|---|---|---|---|
| Our Reference | | 311626-1 | 311626-2 | 311626-3 |
| Your Reference | UNITS | BH01 | BH04 | BH03A |
| Date Sampled | | 25/11/2022 | 25/11/2022 | 25/11/2022 |
| Type of sample | | Water | Water | Water |
| Date prepared | - | 25/11/2022 | 25/11/2022 | 25/11/2022 |
| Date analysed | - | 25/11/2022 | 25/11/2022 | 25/11/2022 |
| pH | pH Units | 4.8 | 6.1 | 6.0 |
| Electrical Conductivity | µS/cm | 560 | 560 | 380 |
| Chloride, Cl | mg/L | 62 | 42 | 33 |
| Sulphate, SO4 | mg/L | 140 | 160 | 89 |

| Method ID | Methodology Summary |
|---|---|
| **Inorg-001** | pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times. |
| **Inorg-002** | Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons. |
| **Inorg-081** | Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis.<br>Alternatively determined by colourimetry/turbidity using Discrete Analyser. |

| QUALITY CONTROL: Miscellaneous Inorganics | | | | | Duplicate | | | | Spike Recovery % | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test Description | Units | PQL | Method | Blank | # | Base | Dup. | RPD | LCS-W1 | [NT] |
| Date prepared | - | | | 25/11/2022 | [NT] | [NT] | [NT] | [NT] | 25/11/2022 | [NT] |
| Date analysed | - | | | 25/11/2022 | [NT] | [NT] | [NT] | [NT] | 25/11/2022 | [NT] |
| pH | pH Units | | Inorg-001 | [NT] | [NT] | [NT] | [NT] | [NT] | 98 | [NT] |
| Electrical Conductivity | µS/cm | 1 | Inorg-002 | <1 | [NT] | [NT] | [NT] | [NT] | 101 | [NT] |
| Chloride, Cl | mg/L | 1 | Inorg-081 | <1 | [NT] | [NT] | [NT] | [NT] | 98 | [NT] |
| Sulphate, SO4 | mg/L | 1 | Inorg-081 | <1 | [NT] | [NT] | [NT] | [NT] | 92 | [NT] |

## Result Definitions

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

## Quality Control Definitions

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

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

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

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

## Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

## Appendix C - Information from Environmental Report (Douglas, 2025b)

Site Assessment Criteria (Appendix G)

Table H2: Summary of Water Laboratory Results for Site Suitability (Appendix H)

# 1. Introduction

## 1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

## 1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and / or derivation of the SAC:

- Land use: residential and commercial (mixed-use as a residential apartment and a hotel). Residential land use will be adopted for this investigation as a conservative method:
  - Corresponding to land use category 'B', residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats.
- Soil type: sand.

# 2. Soils

## 2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 1 and Table 2.

## Table 1: Health investigation levels (mg/kg)

| Contaminant | HIL-B |
|---|---|
| **Metals** | |
| Arsenic | 500 |
| Cadmium | 150 |
| Chromium (VI) | 500 |
| Copper | 30 000 |
| Lead | 1200 |
| Mercury (inorganic) | 120 |
| Nickel | 1200 |
| Zinc | 60 000 |
| **PAH** | |
| B(a)P TEQ | 4 |
| Total PAH | 400 |
| **Phenols** | |
| Phenol | 45 000 |
| Pentachlorophenol | 130 |
| **OCP** | |
| DDT+DDE+DDD | 600 |
| Aldrin and dieldrin | 10 |
| Chlordane | 90 |
| Endosulfan | 400 |
| Endrin | 20 |
| Heptachlor | 10 |
| HCB | 15 |
| Methoxychlor | 500 |
| **OPP** | |
| Chlorpyrifos | 340 |
| **PCB** | |
| PCB | 1 |

### Table 2: Health screening levels (mg/kg)

| Contaminant | HSL-A&B | HSL-A&B | HSL-A&B | HSL-A&B |
|---|---|---|---|---|
| **SAND** | **0 m to <1 m** | **1 m to <2 m** | **2 m to <4 m** | **4 m+** |
| Benzene | 0.5 | 0.5 | 0.5 | 0.5 |
| Toluene | 160 | 220 | 310 | 540 |
| Ethylbenzene | 55 | NL | NL | NL |
| Xylenes | 40 | 60 | 95 | 170 |
| Naphthalene | 3 | NL | NL | NL |
| TRH F1 | 45 | 70 | 110 | 200 |
| TRH F2 | 110 | 240 | 440 | NL |

Notes: TRH F1 is TRH $C_6$-$C_{10}$ minus BTEX
TRH F2 is TRH >$C_{10}$-$C_{16}$ minus naphthalene
The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

### Table 3: Health screening levels for direct contact (mg/kg)

| Contaminant | DC HSL-B | DC HSL-IMW |
|---|---|---|
| Benzene | 140 | 1100 |
| Toluene | 21 000 | 120 000 |
| Ethylbenzene | 5900 | 85 000 |
| Xylenes | 17 000 | 130 000 |
| Naphthalene | 2200 | 29 000 |
| TRH F1 | 5600 | 82 000 |
| TRH F2 | 4200 | 62 000 |
| TRH F3 | 5800 | 85 000 |
| TRH F4 | 8100 | 120 000 |

Notes: TRH F1 is TRH $C_6$-$C_{10}$ minus BTEX
TRH F2 is TRH >$C_{10}$-$C_{16}$ minus naphthalene
IMW intrusive maintenance worker

## 2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2020). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 2 of HEPA (2020) are in Table 4.

**Table 4: Health investigation levels (mg/kg)**

| Contaminant | HIL-B |
|---|---|
| PFOS and PFHxS * | 2 |
| PFOA | 20 |

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

## 2.3 Asbestos in soil

Based on the CSM and / or current site access limitations, a detailed asbestos assessment was not considered to be warranted at this stage. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site. Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this investigation / assessment as an initial screen.

## 2.4 Ecological investigation levels

Ecological Investigation Levels (EILs) and ecological screening levels (ESLs) to be determined in accordance with NEPC (2013), if ultimately deemed appropriate.

It is understood that the proposed development will include excavation of a three-level basement across the site footprint without any landscape area. Therefore, the value of the site for soil organisms and the risk of exposure of soil contamination to transitory wildlife is considered very low.

Accordingly, it is considered that human health risk screening levels are more appropriate and EILs and ESLs are not relevant to the current assessment.

## 2.5 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

The adopted management limits are in Table 5.

**Table 5: Management limits (mg/kg)**

| Contaminant | Soil type | ML-A-B-C |
|---|---|---|
| TRH F1 | Coarse | 700 |
| TRH F2 | Coarse | 1000 |
| TRH F3 | Coarse | 2500 |
| TRH F4 | Coarse | 10 000 |

Notes: TRH F1 is TRH $C_6$-$C_{10}$ including BTEX
TRH F2 is TRH >$C_{10}$-$C_{16}$ including naphthalene
ML-A-B-C residential, parkland and public open space

# 3. Groundwater

## 3.1 Introduction

The groundwater investigation levels (GIL) used for interpretation of the groundwater data (as a Tier 1 assessment) have been selected based on the potential risks posed from contamination sourced from the site to receptors at or down-gradient of the site, as identified by the conceptual site model (CSM). The receptors, exposure points and pathways are summarised in Table 6.

**Table 6: Summary of potential receptors and potential risks**

| Receptor | Location | Exposure point | Exposure pathway |
|---|---|---|---|
| Surface water aquatic ecosystem | Down-gradient from site. | Receiving surface water body at the groundwater discharge point. | Exposure to contaminants. |
| Occupants of buildings | On site and down-gradient from site. | Enclosed buildings (existing or proposed). | Inhalation of VOC (including TRH and BTEX) overlying VOC impacted groundwater via the vapour intrusion pathway. |

The rationale for the selection of GIL is in Table 7.

**Table 7: Groundwater investigation level rationale**

| Receptor / beneficial use | GIL | Source | Comments / rationale |
|---|---|---|---|
| Aquatic ecosystem | DGV | ANZG (2018) | Marine water<br>99% LOP for bioaccumulative contaminants<br>95% LOP for non-bioaccumulative contaminants |
| Aquatic ecosystem | DGV | HEPA (2020) | Marine water 99% LOP as recommended for potential bioaccumulation<br>Screening values were only available for PFOS and PFOA at the time of this investigation. |

| Receptor / beneficial use | GIL | Source | Comments / rationale |
|---|---|---|---|
| Building occupants (vapour intrusion) | HSL | NEPC (2013) | 2 m to <4 m / 4 m to <8 m / 8 m+ |

Notes: DGV default guideline value
% LOP percentage level of protection of species
HSL health screening level

### 3.2 Groundwater investigation levels for aquatic ecosystems

The DGV for the protection of aquatic ecosystems derived from ANZG (2018) are in Table 8.

**Table 8: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)**

| Contaminant | Marine DGV 95% LOP | Notes |
|---|---|---|
| **Metals / metalloids** | | |
| Arsenic | 24 / 13 | Levels provided for As III / As IV respectively as adopted from freshwater criteria in absence of marine criteria. Unknown reliability. |
| Cadmium | 0.7 | 99% LOP adopted as recommended due to potential for bioaccumulation. Very high reliability. |
| Chromium (VI) | 4.4 | Chromium VI levels adopted as initial screen for total chromium. Very high reliability. |
| Copper | 1.3 | Very high reliability. |
| Lead | 4.4 | Low reliability. |
| Mercury (inorganic) | 0.1 | 99% LOP adopted as recommended due to potential for bioaccumulation. Very high reliability. |
| Nickel | 7 | 99% LOP adopted as recommended to protect key species from chronic toxicity. Very high reliability. |
| Zinc | 8 | Very high reliability. |
| **BTEX** | | |
| Benzene | 500 | 99% LOP adopted as recommended to protect key species from chronic toxicity. Moderate reliability. |
| Ethylbenzene | 80 | Unknown reliability. |
| m-Xylene | 75 | Unknown reliability. |
| o-xylene | 350 | Adopted from freshwater criteria for in absence of marine criteria. Unknown reliability. |
| p-Xylene | 200 | Adopted from freshwater criteria for in absence of marine criteria. Unknown reliability. |

| Contaminant | Marine DGV 95% LOP | Notes |
|---|---|---|
| Toluene | 180 | Unknown reliability. |
| **PAH** | | |
| Anthracene | 0.01 | 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| Benzo(a)pyrene | 0.1 | 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| Fluoranthene | 1 | 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| Naphthalene | 50 | 99% LOP adopted as recommended to protect key species from chronic toxicity. Moderate reliability. |
| Phenanthrene | 0.6 | 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| **Phenols** | | |
| Phenol | 400 | Moderate reliability. |
| Pentachlorophenol | 11 | 99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability. |
| **OCP** | | |
| Aldrin | 0.003 | Unknown reliability and LOP. |
| Chlordane | 0.001 | Unknown reliability and LOP. |
| DDT | 0.0004 | Unknown reliability and LOP. |
| Dieldrin | 0.01 | Freshwater criteria adopted in absence of marine criteria.<br>Unknown reliability and LOP. |
| Endosulfan | 0.005 | 99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability. |
| Endrin | 0.004 | 99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability. |
| Heptachlor | 0.0004 | Unknown reliability and LOP. |
| Methoxychlor | 0.004 | Unknown reliability and LOP. |
| **OPP** | | |
| Chlorpyrifos | 0.009 | Low reliability. |
| Diazinon | 0.01 | Freshwater criteria adopted in absence of marine criteria. Unknown reliability. |
| Dimethoate | 0.15 | Freshwater criteria adopted in absence of marine criteria. Unknown reliability. |

| Contaminant | Marine DGV 95% LOP | Notes |
|---|---|---|
| Fenitrothion | 0.001 | Unknown reliability and LOP. |
| Malathion | 0.05 | Freshwater criteria adopted in absence of marine criteria. Unknown reliability. |
| Parathion | 0.004 | Freshwater criteria adopted in absence of marine criteria. Unknown reliability. |
| **PCB** | | |
| Aroclor 1242 | 0.3 | Adopted from freshwater criteria for in absence of marine criteria. 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| Aroclor 1254 | 0.01 | Adopted from freshwater criteria for in absence of marine criteria. 99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability. |
| **Inorganics** | | |
| Ammonia | 910 | Very high reliability. At a receiving body pH of 8. Note: ammonia toxicity is pH and temperature dependent. |

Notes: 95% LOP for non-bioaccumulative contaminants
99% LOP for bioaccumulative contaminants

The DGV for the protection of aquatic ecosystems derived from HEPA (2020) are in Table 9.

**Table 9: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)**

| Contaminant / LOP | Interim marine water DGV |
|---|---|
| PFOS 99% LOP | 0.00023 |
| PFOA 99% LOP | 19 |

### 3.3 Health screening levels for vapour intrusion

The HSL to evaluate potential vapour intrusion risks derived from NEPC (2013) are in Table 10. There are no generic HSL for groundwater within 2 m of the ground (or basement) level.

**Table 10: Groundwater health screening levels for vapour intrusion (µg/L)**

| Contaminant | HSL-A&B | Solubility limit |
|---|---|---|
| **SAND** | **2 m to <4 m** | **-** |
| Benzene | 800 | 59 000 |
| Toluene | NL | 61 000 |
| Ethylbenzene | NL | 3900 |
| Xylenes | NL | 21 000 |
| Naphthalene | NL | 170 |

| Contaminant | HSL-A&B | Solubility limit |
|---|---|---|
| TRH F1 | 1000 | 9000 |
| TRH F2 | 1000 | 3000 |

## 4. References

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

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP)*. Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

Douglas | GROUNDED EXPERTISE

Table H2: Summary of Results of Groundwater Analysis (All results in mg/L)

| Sample ID | Sample Date | Metals (Dissolved) | | | | | | | | Metals (total) | | | | | | | | PAH | | | | | | TRH | | | | | | | | | | | BTEX | | | | | PCB | | | OCP | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Arsenic | Cadmium | Chromium (III + VI) | Copper | Lead | Mercury | Nickel | Zinc | Arsenic | Cadmium | Chromium (III + VI) | Copper | Lead | Mercury | Nickel | Zinc | Naphthalene | Anthracene | Fluoranthene | Benzo(a)pyrene | Phenanthrene | Total Positive PAH | F1 ((C6-C10)-BTEX) | F2 TRH >C10-C16 less Naphthalene | TRH C6-C9 | TRH C6-C10 | C10-C14 | TRH >C10-C16 | C15-C28 | C29-C36 | TRH >C16-C34 | TRH >C34-C40 | Benzene | Toulene | Ethylbenzene | o-xylene | m+p-xylene | Arocler 1242 | Arocler 1254 | Other PCB | Aldrin | Dieldrin | gamma-Chlordane | alpha-Chlordane | pp-DDE | pp-DDT | Endosulfan I | Endosulfan II | Endrin | Heptachlor |
| **Assessment Criteria** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Freshwater Default Guideline Values (DGV) - 95% level species protection [1] | | 24 as As (III); 13 as As(V) | 0.7 | 4.4 | 1.3 | 4.4 | 0.10 | 7 | 8 | 24 as As (III); 13 as As(V) | 0.7 | 4.4 | 1.3 | 4.4 | 0.10 | 7 | 8 | 50 | 0.01 | 1 | 0.1 | 0.6 | - | - | - | - | - | - | - | - | - | - | - | 950 | 180* | 80* | 350 | 75 as Xylene (m); 200 as Xylene (o) | 0.3 | 0.01 | - | 0.001* | 0.01* | 0.001 | 0.001 | - | 0.01 | 0.005 | 0.005 | 0.004 | 0.0004 |
| Health Screening Level (HSL) - sand, groundwater 2 m-<4 m | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | 6000 | NL | - | - | - | - | - | - | - | - | 5000 | NL | NL | NL | | - | - | - | - | - | - | - | - | - | - | - | - | - |
| HEPA (2020) 99% LOP Marine | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BH01 | 30/11/22 | <1 | <0.1 | <1 | **12** | **2** | <0.05 | **24** | **25** | 1 | <0.1 | **22** | **38** | **16** | <0.05 | **45** | **67** | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <10 | <50 | <10 | <10 | <50 | <50 | <100 | <100 | <100 | <100 | <1 | <1 | <1 | <1 | <2 | <0.01 | <0.01 | <PQL | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.002 | <0.002 | <0.001 | <0.001 |
| BH03A | 30/11/22 | <1 | <0.1 | <1 | **23** | **2** | <0.05 | **24** | **26** | 5 | **0.4** | **80** | **88** | **73** | <0.05 | **52** | **190** | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <10 | <50 | <10 | <10 | <50 | <50 | <100 | <100 | <100 | <100 | <1 | <1 | <1 | <1 | <2 | <0.01 | <0.01 | <PQL | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.002 | <0.002 | <0.001 | <0.001 |
| BH04 | 30/11/22 | <1 | <0.1 | <1 | **10** | **2** | <0.05 | **12** | **23** | 1 | <0.1 | **10** | **20** | **9** | <0.05 | **19** | **45** | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <10 | **140** | <10 | <10 | **140** | **140** | **110** | <100 | **170** | <100 | **3** | <1 | <1 | <1 | <2 | <0.01 | <0.01 | <PQL | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.002 | <0.002 | <0.001 | <0.001 |
| BD1 | 30/11/22 | <1 | <0.1 | <1 | **12** | <1 | <0.05 | **34** | **27** | <1 | <0.1 | <1 | **11** | **2** | <0.05 | **27** | **24** | <0.2 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <10 | <50 | <10 | <10 | <50 | <50 | <100 | <100 | <100 | <100 | <1 | <1 | <1 | <1 | <2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Notes:

PQL Practical Quantitation Limit
NL Not Limiting
- not defined/not analysed/not applicable
1 NEPC (2013) and ANZG (2018) Australian and New Zealand Guidelines for Fresh & Marine Water Quality
* Insufficient data for reliable trigger value. Interim working value or low reliability value used for screening purposes

Table H2: Summary of Results of Groundwater Analysis (All results in mg/L)

| Sample ID | Sample Date | OPP | | | | | | | | | | | | | | | Phenol | PFAS | | | VOC | | | | | | | | | | | | | | |