

---

## **Specialist Advice**

### **Report on Preliminary Geotechnical Investigation**

**UNSW N13 Barker Street Student  
Accommodation  
SSDA Submission  
39 Barker Street, Kensington NSW**

**Client: University of New South Wales  
(UNSW)  
Prepared for NGNU Project Management**

**Project 227492.06  
1 December 2025  
Rev 2**

## Document History

### Details

|                            |  |
|----------------------------|--|
| <b>Project No.</b>         | 227492.06  |
| <b>Document Title</b>      | Report on Preliminary Geotechnical Investigation |
| <b>Site Address</b>        | 39 Barker Street, Kensington NSW                 |
| <b>Report Prepared For</b> | University of New South Wales                    |
| <b>Filename</b>            | 227492.06.R.001.Rev2                             |

### Status and Review

| Status     | Prepared by   | Reviewed by     | Date issued      |
|------------|---------------|-----------------|------------------|
| Draft A    | Peter Valenti | Bruce McPherson | 16 June 2025     |
| Revision 0 | Peter Valenti | Bruce McPherson | 10 October 2025  |
| Revision 1 | Peter Valenti | Bruce McPherson | 19 November 2025 |
| Revision 2 | Peter Valenti | Bruce McPherson | 1 December 2025  |

### Distribution of Copies

| Status     | Issued to                                       |
|------------|---|
| Draft A    | Heather Blackman –University of New South Wales |
| Revision 0 | Taisei Tam - University of New South Wales      |
| Revision 1 | Taisei Tam - University of New South Wales      |
| Revision 2 | Taisei Tam - University of New South Wales      |

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

### Signature

### Date

**Author**



1 December 2025

**Reviewer**

pp



1 December 2025

## Table of Contents

---

|  | Page No |
|--|---------|
| 1. Introduction.....                             | 1       |
| 2. Site description.....                         | 2       |
| 3. Relevant SEARs.....                           | 4       |
| 4. Background information.....                   | 4       |
| 4.1 Soil and groundwater contamination.....      | 4       |
| 4.2 Village Green infiltration tank.....         | 4       |
| 4.3 UNSW bore water pumps.....                   | 5       |
| 4.4 Existing Physics Lawn and Village Green..... | 5       |
| 4.5 Existing M15 Rupert Myers building.....      | 6       |
| 4.6 N19 Shalom College.....                      | 6       |
| 5. Published data.....                           | 7       |
| 5.1 Geology.....                                 | 7       |
| 5.2 Soil landscape.....                          | 7       |
| 5.3 Acid sulfate soils.....                      | 7       |
| 5.4 Salinity.....                                | 7       |
| 5.5 Hydrogeology.....                            | 7       |
| 6. Field work.....                               | 7       |
| 6.1 Field work methods.....                      | 7       |
| 6.2 Field work results.....                      | 9       |
| 6.2.1 Boreholes.....                             | 9       |
| 6.2.2 Groundwater levels.....                    | 10      |
| 6.2.3 Hydraulic conductivity testing.....        | 10      |
| 7. Laboratory testing.....                       | 10      |
| 7.1 Pavement materials and soil.....             | 10      |
| 7.2 Rock.....                                    | 15      |
| 8. Proposed development.....                     | 15      |
| 9. Comments.....                                 | 16      |
| 9.1 Geotechnical model.....                      | 16      |
| 9.2 Earthworks.....                              | 18      |
| 9.2.1 Excavation conditions.....                 | 18      |
| 9.2.2 Groundwater.....                           | 18      |
| 9.2.3 Ground vibrations.....                     | 19      |

|       |  |    |
|-------|--|----|
| 9.2.4 | Dilapidation surveys.....                              | 20 |
| 9.2.5 | Disposal of excavated material.....                    | 20 |
| 9.3   | Excavation support .....                               | 20 |
| 9.3.1 | Batter slopes .....                                    | 20 |
| 9.3.2 | Retaining / shoring wall types.....                    | 21 |
| 9.3.3 | Retaining / shoring walls design.....                  | 21 |
| 9.3.4 | Ground anchors.....                                    | 22 |
| 9.4   | Foundations.....                                       | 23 |
| 9.4.1 | Design for axial loading .....                         | 23 |
| 9.4.2 | Design for lateral loading .....                       | 25 |
| 9.5   | Earthquake design.....                                 | 27 |
| 9.6   | Soil aggressivity.....                                 | 27 |
| 9.7   | Subgrade preparation.....                              | 27 |
| 9.8   | Pavements.....   | 28 |
| 9.8.1 | General.....   | 28 |
| 9.8.2 | Preliminary pavement thickness .....                   | 29 |
| 9.8.3 | Drainage .....   | 30 |
| 9.9   | Building slab.....                                     | 31 |
| 9.10  | Stormwater management system (infiltration tank) ..... | 31 |
| 9.11  | Working platforms .....                                | 31 |
| 9.12  | Acid sulfate soils and saline soils.....               | 32 |
| 9.13  | Further Investigation .....                            | 32 |
| 9.14  | Conclusion .....                                       | 32 |
| 9.15  | Mitigation measures .....                              | 32 |
| 10.   | Limitations.....                                       | 34 |

|                    |   |
|--------------------|---|
| <b>Appendix A:</b> | About this Report   |
| <b>Appendix B:</b> | Drawings  |
| <b>Appendix C:</b> | Current Borehole Logs   |
| <b>Appendix D:</b> | Groundwater Level Monitoring and Hydraulic Conductivity Tests |
| <b>Appendix E:</b> | Laboratory Test Results                                       |
| <b>Appendix F:</b> | Previous Borehole Logs  |

# Report on Preliminary Geotechnical Investigation UNSW N13 Barker Street Student Accommodation 39 Barker Street, Kensington NSW

---

## 1. Introduction

This preliminary geotechnical report is submitted to the Department of Planning, Housing and Infrastructure (DPHI) on behalf of the University of New South Wales (UNSW) (the Applicant), to support a State Significant Development Application (SSDA) for the development of three (3) buildings comprising on-campus student accommodation at 39 Barker Street, Kensington.

The project has been identified by the NSW Housing Delivery Authority (HDA) as a key development to help accelerate the delivery of well-located, diverse and affordable housing in metropolitan Sydney. The HDA considered and recommended to the Minister that the project be declared SSD under section 4.36(3) of the EP&A Act on 2 May 2025. Following this recommendation, the Minister declared the project as SSD on 13 May 2025 under the *State Significant Development Declaration Order 2025 (No 7)*. Specifically, the proposed works include the following:

- Site preparation and early works, including demolition of existing structures;
- Construction of 3 on-campus student accommodation buildings, delivering 732 beds across 5 colleges and self-catered apartments, together with 30 beds across non-student residences (Dean's apartments and short-stay accommodation), communal services and shared amenities;
- Reconfiguration of Southern Drive, including its partial closure and redirection to the western boundary of the site, to provide driveway access into the campus; and
- Associated landscaping (including tree removal and transplanting) and public domain works; and

Augmentation of physical infrastructure and utilities, as required.

For a detailed description of the proposed development, refer to the Environmental Impact Statement (EIS) prepared by Beam Planning, and the Architectural Drawings prepared by Bates Smart.

From a geotechnical perspective, the proposed development generally includes the demolition of the existing buildings to allow for the construction of three, multistorey buildings (Blocks A, B and C) of 4 to 5 storeys at southern side and up to 10 to 14 storeys on northern side, for student accommodation. The proposed building floor levels range from about RL 29.1 to RL 30.1 for Block A at the eastern end to about RL 26.8 to RL 28.4 for Block C at the western end, and will require cut and fill earthworks anticipated to be up to about 1 m. A public domain along Southern Drive, landscaping and a new Science Road extension along the western site boundary from Barker Street are also proposed and will require similar cut and fill earthworks for subgrade preparation.

The investigation was commissioned by UNSW and was undertaken in line with Douglas' proposal 227492.06.P.001.Rev1 dated 11 November 2024 and 227492.06.P.002.Rev0 dated 20 August 2025.

This report has been prepared to assess the subsurface soil, rock and groundwater conditions at the site, to provide geotechnical advice relating to the proposed development.

The investigation included the drilling of two deep rock-cored boreholes, 16 shallow augered boreholes, mainly for contamination assessment purposes as well as to assess the existing Science Road/Southern Drive pavement profile and subgrade (at three of the 16 shallow borehole locations), groundwater monitoring from four wells and laboratory testing of selected samples. The details of the field work and laboratory testing are presented in this report, together with comments and recommendations on geotechnical aspects for the proposed development including excavation conditions and support, groundwater, foundations and pavements.

Douglas has also completed the following reports for this project:

- Groundwater Monitoring Program (227492.08.R.002) to advise on groundwater management and dewatering for disposal off-site during the construction works;
- Preliminary Site Investigation (PSI) for soil and groundwater contamination (ref: report 227492.10.R.001); and
- Detailed Site Investigation (DSI) for soil contamination (ref: report 227492.10.R.003).

## 2. Site description

The site is located at 39 Barker Street, Kensington within the City of Randwick Local Government Area (LGA). It is legally identified as part Lot 3 in DP1264172 and is situated along the southern boundary of the UNSW Kensington Campus.

The site has a frontage of 143 m along Barker Street and extends 50 m into the UNSW campus (including Southern Drive). The site is currently occupied by the Barker Street student housing apartments containing 260 beds and ranging between 3-5 storeys. An aerial image of the site is shown below in Figure 1.



**Figure 1: Aerial image of the site (approximate extent of works shown) outlined in red). Source: Beam Planning**

The site location is also shown on Drawing 1 in Appendix B.

The area of the proposed buildings is currently occupied by three to five-storey brick buildings (student accommodation) with landscaped gardens, trees and mostly brick-paved footpaths. A main pedestrian walkway or thoroughfare extends from Barker Street Gate 15 through the building complex to Southern Drive and splits the apartment buildings into two building complexes.

The site is surrounded by UNSW property (except to the south) as follows:

- Southern Drive followed by Science Road, the Physics Lawn and the Village Green sport complex to the north. The road and footpath surfaces include asphaltic concrete (AC) and concrete pavements;
- A main entry / Gate 14 with a four-lane asphaltic concrete (AC) pavement followed by the M15 Rupert Myers Building to the east;
- Barker Street nature strip and AC pavement (understood to be operated by Randwick City Council, RCC) followed by commercial and residential properties to the south; and
- Three-storey brick buildings (N19 Shalom College) to the west.

The ground surface slopes gently down towards the west and south with surface levels ranging from about RL 30 to RL 26 relative to Australia height datum (AHD). The eastern complex has a brick retaining wall up to about 0.9 m high extending along the southern site boundary, with the apartments/garden area of the complex above the level of Barker Street.

Numerous inground services are present, including UNSW’s high-voltage electrical service ring that extends from the substation kiosks at the south side of the site around to the north-western corner of the site.

### 3. Relevant SEARs

This preliminary geotechnical investigation report addresses the following relevant Secretary’s Environmental Assessment Requirements (SEARs) set out in Table 1 below.

**Table 1: SEARs Compliance Table**

| SEARs Item                            | Issue and Assessment Requirements   | Documentation  | Response/Location in Report                              |
|---------------------------------------|---|--|--|
| 12. Ground and Groundwater Conditions | <p><i>Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion.</i></p>  | <p><i>Geotechnical Assessment</i></p>  | <p>Sections 5.1 to 5.5 inclusive, 6.2, 9.6 and 9.12.</p> |
|                                       | <p><i>Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies.</i></p> | <p><i>If required: Groundwater Impact Assessment, Salinity Management Plan, Acid Sulfate Soils Management Plan</i></p> | <p>Sections 5.1 to 5.5 inclusive, 9.12.</p>              |

### 4. Background information

#### 4.1 Soil and groundwater contamination

A Preliminary Site Investigation (PSI) for soil / groundwater contamination and acid sulfate soils was undertaken by Douglas concurrently with this geotechnical investigation and the findings of the PSI are provided in a separate report (ref: 227492.10.R.001).

#### 4.2 Village Green infiltration tank

The Village Green playing field was constructed in 2021/2022, with a large stormwater infiltration tank buried at about RL 23.0 to RL 23.5 m below the playing field that has a surface level at about RL 27.4 m. It is understood that the operation of the infiltration tank began around mid-to-late 2022. With the Village Green located at the lowest area of the Kensington campus, stormwater flows from a large upstream catchment area towards the Village Green fields. The purpose of the

infiltration tank is to temporarily store stormwater for infiltration into the underlying sands, to alleviate the flooding of the sports fields that has occurred historically in this area.

#### 4.3 UNSW bore water pumps

It is understood from UNSW that groundwater (volume in the order of 0.8-1.3 ML/day in February /March 2025) is pumped daily from several bore water pumps located across the lower campus “catchment area” for reuse across the campus. This is likely to lower the natural groundwater levels across the lower campus area, with drawdown effects more concentrated around the water bore locations. If pumping from the water bores was to stop or be reduced in volume, the groundwater level across the lower campus would likely rise.

#### 4.4 Existing Physics Lawn and Village Green

Douglas previously completed geotechnical investigations and long-term groundwater level monitoring (ref: Project Numbers 86763.00 and 86978.02) for the UNSW Wellness Precinct (i.e. Physics Lawn and Village Green) as well as for the Village Green alone, located to the north of the subject site.

The locations of two previous boreholes / groundwater monitoring wells (EH05 and EH08) close to the subject site are shown on Drawing 1 in Appendix B. The borehole results are also summarised in the interpreted geotechnical cross-sections in Appendix B. The previous borehole logs, well logs and measured groundwater levels are included in Appendix F for reference.

The subsurface conditions within the Physics Lawn area can be summarised as predominantly sandy fill to depths less than 1 m underlain by fine to medium grained natural sand (generally increasing in density with depth) and then Hawkesbury Sandstone. The top of rock generally dips down from east to west from about RL 24 m to RL 20 m. The depths to rock are deeper further west at the Village Green.

Long-term groundwater level monitoring occurred for about 3.5 years from 2 May 2019 to 26 October 2022 at the two wells (EH05 and EH08) located along the southern side of the Physics Lawn. The amount of rainfall measured at a nearby weather station is shown on the groundwater monitoring graphs in Appendix F. The monitoring period coincided with significant rainfall events, particularly throughout early 2022. The groundwater levels can be seen to rise by about 3 m in early 2022 with the significant rainfall and by up to 4 m over the monitoring period. A summary of recorded groundwater levels is presented in Table 2. The daily ups and downs in groundwater levels evident in 2019 may be attributed to the pumping of groundwater from the UNSW water bores and irrigation of landscaped areas in the lower campus.

**Table 2: Summary of Groundwater Monitoring Results 2 May 2019 to 26 October 2022**

| Well ID | Monitoring Period    | Surface Reduced Level (m, AHD) | Approximate Groundwater Level (RL, m AHD) |         |         |
|---------|----------------------|--------------------------------|---|---------|---------|
|         |                      |                                | Minimum                                   | Average | Maximum |
| EH05    | 2.5.2019 -26.10.2022 | 27.8                           | 20.4                                      | 21.7    | 24.3    |
| EH08    | 2.5.2019 -26.10.2022 | 29.8                           | 22.1                                      | 23.7    | 25.4    |

The results of 14 in situ permeability test results previously undertaken within sandy soils at depth ranges of 1.0-1.5 m and 3.0-4.0 m across the Physics Lawn and Village Green fields indicated that the saturated soil permeability ( $K_{sat}$ ) ranged between  $7.46 \times 10^{-6}$  m/s and  $1.5 \times 10^{-4}$  m/s, with an average value of  $4.5 \times 10^{-5}$  m/s.

#### 4.5 Existing M15 Rupert Myers building

Douglas completed a geotechnical investigation (ref: Report 14319C dated 30 May 1997) for M15 Rupert Myers Building (formerly named "Sites X and Y" at the time of the investigation) that included a rock-cored borehole (BH2) that is about 20 m east of the south-east corner of the subject N13 site.

The location of the previous borehole (BH2) is shown on Drawing 1 in Appendix B and is also included in the interpreted geotechnical cross-section in Appendix B. The previous borehole log is included in Appendix F.

The subsurface conditions encountered within the previous borehole BH2 generally included loose underlain by medium dense silty sand; with very low strength Hawkesbury Sandstone encountered at a depth of about 10.3 m (RL 19.9). About 150 mm of core loss occurred at about RL 15.7. Very low strength siltstone (about 200 mm thick) was encountered directly below the core loss zone. Medium to high strength and high strength sandstone was encountered below a depth of about 11.9 m (RL 18.3) and extend to the base of the borehole (at about 17.5 m depth/RL 12.7).

Groundwater was measured within the sand at a depth of about 8.6 m (RL 21.6) whilst auger drilling on 2 May 1997.

It is understood that the Rupert Myers Building does not have underground basement levels.

#### 4.6 N19 Shalom College

Douglas previously completed a geotechnical investigation (ref: Report 2392 dated 1970) for the Shalom College that included augered boreholes and dynamic penetrometer tests (DPTs) to assess the soil consistency/density. The precise locations of the boreholes/DPTs are unknown, however, the results generally indicate subsurface conditions including loose sand to about 3.3 m depth, underlain by medium dense sand to at least 5.5 m, at which depth the boreholes were discontinued. The depth to bedrock was not confirmed. Groundwater was measured at depths of about 4.5 m to 5 m below ground surface at the time of investigation.

Based on the geotechnical advice and building size, it is anticipated that the Shalom College building is supported by shallow strip/pad footings in mostly ground improved/recompacted sand and loose sand, with no basement levels present.

## 5. Published data

### 5.1 Geology

Reference to the New South Wales Seamless Geology Map indicates that the site is underlain by marine-deposited and aeolian (wind-blown) fine to coarse-grained quartz-lithic sand. Hawkesbury Sandstone which typically comprises medium to coarse grained quartz sandstone with some shale and laminite bands or lenses is shown to be present to the east of the site at higher ground levels.

### 5.2 Soil landscape

Reference to the Sydney 1:100,000 Soils Landscape Sheet indicates that the site is underlain by aeolian (wind-blown) sand deposited within the Holocene Age. These soils are highly susceptible to soil erosion and are typically of very low soil fertility.

### 5.3 Acid sulfate soils

Reference to the regional Acid Sulfate Soils (ASS) Risk map indicates that the site is not located in an area of ASS potential.

### 5.4 Salinity

Reference to the Salinity Potential in Western Sydney 2002 map prepared by the former Department of Planning Infrastructure and Natural Resources indicates the site is not located in an area of salinity potential and is located outside the boundary of the mapping.

### 5.5 Hydrogeology

The regional groundwater table is expected to be within the sand that overlies the Hawkesbury Sandstone and generally flow towards the south and west. Watercourses are located at least 400 m away from the site.

The site is located within the Botany Sands aquifer or otherwise named the 'Botany Sands Groundwater Source' by the Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2024 under the Water Management Act 2000.

## 6. Field work

### 6.1 Field work methods

A summary of the field work is presented as follows:

- Borehole locations set out and scanning undertaken for underground services at each location using an accredited services locator with supervision by Douglas;
- Non-destructive drilling at boreholes BH1 and BH2 to depths of 1.9 m to confirm the drilling locations were clear of buried services;

- Two rock-cored boreholes (BH1 and BH2) were drilled to depths of 20.3 m and 20.4 m. The boreholes were drilled by solid flight auger and then rotary wash-boring (i.e. water-induced) techniques to the top of weathered rock, then extended to their target depths using NMLC sized (approximately 52 mm diameter) diamond coring equipment;

The presence of numerous in-ground services together with limited site access for a drill rig led to the drilling of two rock-cored boreholes, only at this stage of the development;

Standard penetration tests (SPT) were undertaken at about 2.5 m depth and then at approximately 1.5 m depth intervals within the cored boreholes BH1 and BH2;

- 13 shallow boreholes (BH3 to BH6 and BH104 to BH112) were auger drilled using a hand auger/tools to depths of between 0.6 m and 1.8 m in fill. Boreholes BH104 to BH106 were drilled primarily for the purpose of the proposed Science Road extension and public domain, at locations requested by the civil designer ARUP. Boreholes BH3 to BH6 and BH107 to BH112 were primarily completed for the contamination investigation carried out in conjunction with this (geotechnical) investigation;
- Three boreholes (BH101 to BH103) were drilled to 1.5 m depth in the existing road pavement at Science Road and Southern Drive to log and test the existing pavement profile and subgrade conditions. Core drilling through the AC and reinforced concrete pavements was initially undertaken to allow auger drilling to depth below, using a truck-mounted auger drilling rig. Dynamic penetrometer (DCP/PSP) tests were undertaken to assess the soil consistency/strength;
- Disturbed soil samples were collected for subsequent laboratory tests and identification purposes. Rock core samples underwent point-load strength index tests;
- The combined geotechnical and environmental boreholes were logged by an experienced geotechnical engineer/geologist and the environmental boreholes by an experienced environmental scientist, based on visual and tactile observations of recovered materials;
- Two groundwater (standpipe) monitoring wells were installed at BH1 and BH2 in the sandy soils to the top of rock, to allow measurement of groundwater levels. Well construction details are provided on the respective borehole logs;
- Permeability tests of the sand by way of falling-head and rising-head tests were undertaken in the monitoring wells at BH1 and BH2; and
- A data logger was installed in the two new wells (BH1 and BH2) and two previously installed wells (EH05 and EH08, located at the nearby in Physics Lawn) to continuously monitor the variation of groundwater levels during the investigation period. The data loggers will remain in the wells to measure groundwater levels for a period of one year (these results will be reported in a subsequent report)

The borehole and groundwater monitoring well locations are shown on Drawing 1 in Appendix B. Coordinates and surface levels for all locations were determined using a differential Global Positioning System (dGPS) receiver. Satellite coverage at some locations was poor due to overhead obstructions, and as such the surface level at these borehole locations could not be accurately established and were interpolated from the site survey (ref: Drawing No. K-SS-2024.038 Revision A, dated 26 June 2024). Coordinates are reported using GDA 2020 MGA Zone 56 and levels are relative to Australian height datum (AHD).

## 6.2 Field work results

### 6.2.1 Boreholes

The detailed subsurface conditions encountered in the boreholes are presented on the borehole logs in Appendix C along with notes defining descriptive terms and classification methods. Photographs of the recovered rock cores are also included. The results of the dynamic penetrometer (DCP/PSP) are shown on the respective borehole logs.

The general subsurface profile intersected by the boreholes, in increasing depth order, may be summarised as follows:

- ROAD PAVEMENT MATERIALS**
- At BH101, an approximate 250 mm thick reinforced concrete pavement underlain by well compacted, sand with a trace of gravel and silt ("basecourse layer") to 0.4 m depth.
  - At BH102 and BH103, an approximate 50 mm and 100 mm thick asphaltic concrete layer (appears to be AC10) was underlain by well compacted, sand with silt/gravel (BH102) and sandy gravel with silt (BH103) as a basecourse layer, to depths of 0.35 m and 0.4 m, respectively;
- FILL**
- Sandy gravel, silty sand, clayey sand and sand fill to depths of about 0.5 m to 1.3 m in all boreholes except at BH3 to BH6 and BH107 where fill extended to depths greater than the auger refusal depths (0.6 m to 1.0 m) and at BH105 where the borehole was discontinued at 1.5 m;
  - Inclusions of sandstone of gravel, cobble and/or boulder size, inclusions of ash, ceramic, charcoal, glass, clinker, slag, igneous/basalt gravel and plastic were variably encountered in the boreholes. An asbestos cement fragment was encountered at BH102 at 0.9 m to 1.0 m depth in the sandy fill layer.
  - The fill appeared to be variably compacted in BH1, BH2 and BH101 to BH103 where dynamic penetrometer (DCP/PSP) or SPT testing was undertaken.
- SAND/NATURAL SOIL**
- non-plastic, fine to medium grained sand, initially loose (and apparently medium dense below the existing pavement at BH101 to BH103) becoming dense and very dense with depth. In the deeper boreholes BH1 and BH2, some decomposed wood/charcoal bands were encountered within the natural sand to about RL 18 and RL 23.
- Hawkesbury Sandstone**
- Variably low to medium and medium to high strength sandstone with very low strength bands below depths of 13.7 m (RL 13.1) and 11.5 m (RL 17.1) at BH1 and BH2, respectively. Some possible very low strength rock and/or clay bands were encountered in the form of core loss sections.
  - Consistent medium strength sandstone below depths of 14.6 m (RL 12.2) and 12.6 m (RL 16.0) at BH1 and BH2, respectively.
  - Consistent high strength sandstone below depths of 19.5 m (RL 7.3) and 14.1 m (RL 14.5) at BH1 and BH2, respectively.

No free groundwater was observed within the boreholes whilst auger drilling. The use of water as a drilling fluid during rotary wash-boring below 5.5 m depth (and then rock-coring) precluded measurement of the groundwater level during the drilling of the rock-cored boreholes (BH1 and BH2).

### 6.2.2 Groundwater levels

The results of the groundwater level monitoring between 8 May 2025 and 11 August 2025 (i.e. about three months) from four monitoring wells (BH1, BH2, EH05 and EH08) located near the northern side of the proposed buildings (noting the well at EH05 is located near the proposed infiltration tank) are provided in Appendix D and are summarised in Table 3.

**Table 3: Results of Groundwater Level Measurements**

| Well ID | Monitoring Period            | Surface Reduced Level (m, AHD) | Approximate Groundwater Level (RL, m AHD) |         |         |
|---------|------------------------------|--------------------------------|---|---------|---------|
|         |                              |                                | Minimum                                   | Average | Maximum |
| BH1     | 8 May 2025 to 11 August 2025 | 26.8                           | 21.3                                      | 21.7    | 22.1    |
| BH2     | 8 May 2025 to 11 August 2025 | 28.6                           | 21.5                                      | 22.0    | 22.4    |
| EH05    | 8 May 2025 to 11 August 2025 | 27.9                           | 21.5                                      | 21.9    | 22.3    |
| EH08    | 8 May 2025 to 11 August 2025 | 29.8                           | 23.7                                      | 24.0    | 24.3    |

The groundwater levels ranged between about 4 m and 7 m below the current ground surface and steadily rose by about 0.5 m to 1.0 m from the start of the monitoring period, most likely attributed to the significant rainfall experienced over the three months of monitoring.

Reference should also be made to Table 2 above, that shows the results of groundwater level monitoring from 2019 to 2022 at two well locations (i.e. EH05 and EH08).

### 6.2.3 Hydraulic conductivity testing

Hydraulic conductivity testing was undertaken at the monitoring wells BH1 and BH2. The results of the hydraulic conductivity tests are included in Appendix D and summarised below.

The test results indicate the sand has a hydraulic conductivity (k) in the order of  $2 \times 10^{-5}$  m/s to  $6 \times 10^{-5}$  m/s over the length of the well screen within the sand.

## 7. Laboratory testing

### 7.1 Pavement materials and soil

California Bearing Ratio (4-day soaked CBR) testing was undertaken on selected samples from BH1 to BH3.. Additional testing for resilient modulus testing on the existing AC pavement,

together with a suite of laboratory tests comprising particle size distribution (PSD), Atterberg Limits, linear shrinkage, field moisture content and CBR tests were undertaken on the “basecourse”, the underlying sandy fill and natural sand from boreholes BH101 to BH106, as requested by the civil engineer from ARUP.

The resilient modulus testing on two AC pavement cores from BH102 and BH103 indicated that the core samples tested had an average resilient modulus of 4410 MPa and 7210 MPa, as well as a maximum density of 2.476 t/m<sup>3</sup> and 2.461 t/m<sup>3</sup>, respectively.

The soil plasticity, field moisture content, CBR and PSD test results are summarised in Table 4.

**Table 4: Summary of CBR, Atterberg Limit, Linear Shrinkage and Moisture Content Test Results**

| Bore No. | Depth (m) | Soil                       | LL % | PL % | PI % | LS % | FMC % | OMC % | MDD (t/m <sup>3</sup> ) | Swell % | CBR % | Soil Description to AS1726:2017 <sub>1</sub> |
|----------|-----------|----------------------------|------|------|------|------|-------|-------|-------------------------|---------|-------|--|
| BH1      | 0.1-0.4   | FILL / Silty SAND          |      |      |      |      | 11.8  | 11.5  | 1.91                    | -0.5    | 70    |  |
| BH2      | 0.1-0.4   | FILL / Clayey SAND         |      |      |      |      | 10.5  | 10.5  | 2.00                    | 0       | 40    |  |
| BH3      | 0.1-0.3   | FILL / Silty SAND          |      |      |      |      | 16.4  | 16.5  | 1.69                    | 0       | 16    |  |
| BH101    | 0.25-0.4  | FILL / SAND ("basecourse") |      |      |      |      | 3.7   | 10.5  | 1.64                    | 0       | 8     | FILL/ SAND trace gravel, trace silt          |
| BH101    | 0.25-0.3  | FILL / SAND ("basecourse") | NO   | NO   | NP   |      | 5.8   |       |                         |         |       |  |
| BH101    | 0.4-0.9   | FILL / SAND                |      |      |      |      | 3.0   | 14.0  | 1.69                    | 0       | 30    | FILL / SAND trace gravel, trace silt         |
| BH101    | 0.4-0.5   | FILL / SAND                | NO   | NO   | NP   |      | 2.2   |       |                         |         |       |  |

| Bore No. | Depth (m) | Soil                           | LL % | PL % | PI % | LS % | FMC % | OMC % | MDD (t/m <sup>3</sup> ) | Swell % | CBR % | Soil Description to AS1726:2017 <sup>1</sup> |
|----------|-----------|--------------------------------|------|------|------|------|-------|-------|-------------------------|---------|-------|--|
| BH101    | 1.4-1.5   | SAND                           | NO   | NO   | NP   |      | 1.4   |       |                         |         |       |  |
| BH102    | 0.05-0.35 | FILL/SAND (basecourse)         |      |      |      |      | 7.5   | 9.5   | 1.86                    | 0.6     | 40    | FILL/SAND with silt, with gravel             |
| BH102    | 0.05-0.2  | FILL/SAND (basecourse)         | NO   | NO   | NP   |      | 9.6   |       |                         |         |       |  |
| BH102    | 0.4-0.5   | FILL/SAND                      | NO   | NO   | NP   |      | 5.2   |       |                         |         |       |  |
| BH102    | 0.5-1.0   | FILL/SAND                      |      |      |      |      | 4.7   | 14.0  | 1.70                    | 0       | 20    | FILL/SAND trace silt                         |
| BH102    | 1.4-1.5   | SAND                           | NO   | NO   | NP   |      | 2.1   |       |                         |         |       |  |
| BH103    | 0.1-0.4   | FILL/Sandy GRAVEL (basecourse) |      |      |      |      | 7.0   | 9.5   | 2.17                    | 0       | 100   | FILL / Sandy GRAVEL with silt                |
| BH103    | 0.1-0.2   | FILL/Sandy GRAVEL (basecourse) | 21   | 18   | 3    | 2.0  | 7.3   |       |                         |         |       |  |

| Bore No. | Depth (m) | Soil        | LL % | PL % | PI % | LS % | FMC % | OMC % | MDD (t/m <sup>3</sup> ) | Swell % | CBR % | Soil Description to AS1726:2017 <sup>1</sup> |
|----------|-----------|-------------|------|------|------|------|-------|-------|-------------------------|---------|-------|--|
| BH103    | 0.4-0.8   | FILL / SAND |      |      |      |      | 7.5   | 12.5  | 1.90                    | 0       | 35    | FILL/SAND with gravel, with silt             |
| BH103    | 0.4-0.5   | FILL / SAND | 18   | NO   | NP   |      | 7.7   |       |                         |         |       |  |
| BH103    | 0.9-1.0   | SAND        | NO   | NO   | NP   |      | 1.7   |       |                         |         |       |  |
| BH104    | 0.4-0.5   | FILL / SAND |      |      |      |      | 12.6  | 12.5  | 1.88                    | 0       | 40    | FILL/SAND with gravel, with silt, trace clay |
| BH104    | 1.1-1.5   | SAND        |      |      |      |      | 6.2   | 13.5  | 1.67                    | 0       | 17    | SAND with silt                               |
| BH105    | 0.5-1.5   | FILL / SAND |      |      |      |      | 8.2   | 10.5  | 1.86                    | 0       | 35    | FILL/SAND with silt, trace clay              |
| BH106    | 0.15-0.45 | FILL / SAND |      |      |      |      | 16.2  | 20.0  | 1.64                    | -0.5    | 10    | FILL/SAND with silt, with gravel             |
| BH106    | 0.15-0.25 | FILL / SAND | NO   | NO   | NP   |      | 11.5  |       |                         |         |       |  |
| BH106    | 0.7-1.5   | SAND        |      |      |      |      | 5.5   | 11.5  | 1.62                    | -0.5    | 13    | SAND trace silt                              |

Legend: LL: Liquid Limit, PL: Plastic Limit PI: Plasticity Index, LS: Linear Shrinkage, FMC: Field Moisture Content OMC: Optimum Moisture Content, MDD: Maximum Dry Density, NO: Not Obtainable, NP: Non-Plastic;

1. Soil Classification based on Particle Size Distribution Test

Selected soil samples were submitted for aggressivity testing (pH, sulfate, chloride and electrical conductivity). The results are summarised in Table 5.

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

| Bore No. | Sample Depth (m) | Description | pH  | Sulfate- (mg/kg) | Chloride (mg/kg) | Electrical Conductivity (µS/cm) | Electrical Resistivity <sup>1</sup> (ohm.cm) |
|----------|------------------|-------------|-----|------------------|------------------|---------------------------------|--|
| BH1      | 1.4-1.5          | SAND        | 7.3 | <10              | <10              | 54                              | 18,519                                       |
| BH1      | 5.5-5.95         | SAND        | 6.9 | <10              | <10              | 22                              | 45,455                                       |
| BH1      | 13.0-13.2        | SAND        | 6.2 | <10              | 10               | 59                              | 16,949                                       |
| BH2      | 2.5-2.95         | SAND        | 6.5 | 140              | 10               | 98                              | 10,204                                       |
| BH2      | 5.5-5.95         | SAND        | 6.6 | 10               | <10              | 21                              | 47,619                                       |
| BH2      | 8.5-8.77         | SAND        | 6.6 | <10              | <10              | 22                              | 45,455                                       |

Notes: 1 - Electrical resistivity is calculated based on laboratory test results of electrical conductivity.

The detailed test certificates of the laboratory tests are presented in Appendix E.

## 7.2 Rock

Selected samples of the rock core were tested to determine the Point Load Strength Index ( $I_{S50}$ ) values, to assist with the rock strength classification. The results of the testing are shown on the borehole logs at the appropriate depths. The  $I_{S50}$  values for the rock ranged from about 0.2 MPa to 1.4 MPa, indicating that the rock samples tested ranged from low strength to high strength.

## 8. Proposed development

The proposed development generally includes three, multistorey buildings (Blocks A, B and C) of 4 to 5 storeys at the southern side and up to 10 to 14 storeys on the northern side, for student accommodation. The proposed building finished floor levels (FFL) range from about RL 29.1 to RL 30.1 for Block A at the eastern end to about RL 26.8 to RL 28.4 for Block C at the western end, and will require cut and fill earthworks anticipated to be up to about 1 m. A public domain along Southern Drive, landscaping and a new Science Road extension along the western site boundary from Barker Street are also proposed.

Deeper, detailed localised excavations for lift shafts (up to about 2 m deep), services and footings are anticipated below the proposed building finished floor levels (FFL). The proposed lift pit and building core/stair excavations are anticipated to extend to levels of about RL 27.5 at Block A, RL 26.2 to RL 26.7 at Block B and RL 25.7 at Block C (assumes excavation is 2 m below the lowest proposed FFL).

The ground surface levels beyond the building footprints will generally slope down towards the south-west and range from about RL 29.5 (north-eastern corner) to RL 25.8 (south-western corner), similar to the existing surface levels beyond.

It is understood that the probable maximum flood (PMF) level is at RL 28.43 for a flood that has a 1 in 100 likelihood of occurring in any given year, that is, an annual exceedance probability (AEP) of 1%. The PMF level is above the ground surface at the western end of the site and grades down to just below the ground surface at the eastern end.

For stormwater management, an infiltration tank is proposed within the western end of Physics Lawn, north of the site boundary. The current ground surface in the proposed area of the tank is about RL 27.5 to RL 28.5. It is understood from ARUP that the tank dimensions may be between about 120 m<sup>2</sup> and 400 m<sup>2</sup> with corresponding depths of between 0.5 m and 2 m. The tank design will depend on the subsoil, hydraulic conductivity and groundwater levels.

## 9. Comments

### 9.1 Geotechnical model

Two geotechnical cross-sections A-A' and B-B' in Appendix B (Drawings 2 to 3) show the interpreted layers of soil and rock units between the borehole locations. The interpreted boundaries shown on the sections are accurate only at the borehole locations and layers shown diagrammatically on the drawing are inferred only. Bands of lower or higher strength rock may be present within the generalised rock layers, including decomposed seams with soil-like properties. For Section A-A' where the previous boreholes EH05 and EH08 are offset some 25 m-30 m to the north of the section alignment, the strata boundaries are shown through the current boreholes along the section alignment, with the previous boreholes shown as additional information.

The rock encountered in the rock-cored boreholes has been classified in accordance with Pells et al (2019) "Classification of Sandstone and Shale in the Sydney Region: A Forty Year Review" Aust. Geomechanics Journal, June 2019. There are five classes of rock (Class I to V) based on strength, fracturing and the amount of defects such as rock joints and clay seams. Class I rock is the best quality (high strength with very few defects) while Class V represents the lowest quality rock (very low strength and / or numerous defects) in the classification system.

A summary of the sequence of geological strata encountered in the current and previous boreholes, including the rock classification (as per Pells et al, 2019) is given in Table 6 and the interpreted depth and reduced level at the top of the defined geological units is given in Table 7.

In general, the site surface is covered by a predominantly sandy fill material with inclusions of sandstone of variable size (gravel to boulder size) and anthropogenic materials extending to typical depths of about 0.6 m to 1.0 m and possibly deeper along the southern side of the site where the ground surface is raised above the Barker Street level. The fill is underlain by aeolian sands that are initially loose and grade to dense and very dense with depth. Some decomposed wood fragments were present in the upper sand layers. Sand extends to the top of Hawkesbury Sandstone, that generally dips down towards the south and west. The upper 1-2 m of sandstone is initially variable in strength and grades to a more consistent medium strength and then high strength sandstone with depth.

**Table 6: Summary of Geological Strata Units**

| <b>Geological Unit / Classification</b>  | <b>Geological Strata Description</b>   |
|--|--|
| Unit 1 - Fill  | Pavement materials in the existing road including reinforced concrete, asphaltic concrete and basecourse sand and sandy gravel.<br>Mostly sandy fill and ripped sandstone with inclusions of various anthropogenic materials (including ash, clinker, slag and an asbestos cement fragment at BH102) |
| Unit 2 – Natural Sand  | Sand, non-plastic, inferred Aeolian  |
| Unit 3 – Variably Low to Medium and Medium to High strength Sandstone with Very Low Strength Bands | Hawkesbury Sandstone – Variably low to medium and medium to high strength sandstone with very low strength bands, deeply weathered and slightly weathered, fractured and slightly fractured, generally pale brown and red, fine to coarse grained sandstone  |
| Unit 4 – Consistent Medium strength Sandstone (Class III)  | Hawkesbury Sandstone – Consistent medium strength, fresh, slightly fractured to unbroken, generally pale grey, medium to coarse grained sandstone, with some medium to high strength zones   |
| Unit 5 – Consistent High strength Sandstone (Class II)   | Hawkesbury Sandstone – Consistent high strength, fresh, slightly fractured to unbroken, generally pale grey, medium to coarse grained sandstone  |

**Table 7: Summary of Depths (and Reduced Levels) to Top of Various Units for Deep Boreholes**

| <b>Bore</b>    | <b>Surface RL (AHD)</b> | <b>Depth (m) and (Reduced Level (RL)) to top of Unit</b> |               |                |                |                |                         |
|----------------|-------------------------|--|---------------|----------------|----------------|----------------|-------------------------|
|                |                         | <b>Unit 1</b>  | <b>Unit 2</b> | <b>Unit 3</b>  | <b>Unit 4</b>  | <b>Unit 5</b>  | <b>Base of Borehole</b> |
| BH1            | 26.8                    | 0<br>(26.8)  | 0.8<br>(26.0) | 13.7<br>(13.1) | 14.6<br>(12.2) | 19.5<br>(7.3)  | 20.4<br>(6.4)           |
| BH2            | 28.6                    | 0<br>(28.6)  | 0.8<br>(27.8) | 11.5<br>(17.1) | 12.6<br>(16.0) | 14.1<br>(14.5) | 20.3<br>(8.3)           |
| EH05<br>(2019) | 27.8                    | 0<br>(27.8)  | 0.6<br>(27.2) | 8.0<br>(19.8)  | 10.8<br>(17.0) | 14.0<br>(13.8) | 18.2<br>(9.6)           |
| EH08<br>(2019) | 29.8                    | 0<br>(29.8)  | 0.7<br>(29.1) | NE             | 6.4<br>(23.4)  | 13.9<br>(15.9) | 20.4<br>(9.4)           |
| BH2<br>(1997)  | 30.2                    | 0<br>(30.2)  | 0<br>(30.2)   | 10.3<br>(19.9) | 11.9<br>(18.3) | 15.0<br>(15.2) | 17.5<br>(12.7)          |

Notes: All figures are approximate and are rounded to 1 decimal place. NE = Not Encountered.

The groundwater level monitoring to date indicates that a groundwater table exists within the sand.

The groundwater levels near the north-eastern corner of the site were measured at levels between about RL 22.1 and RL25.4 in 2019 to 2022 at EH08, and between RL 21.5 and RL 24.3 in 2025 at EH08 and BH2.

The groundwater levels near the north-western corner of the site were measured at levels between about RL 20.4 and RL 24.3 in 2019 to 2022 at EH05, and between RL 21.3 and RL 22.3 in 2025 at EH05 and BH1.

At the wells within Physics Lawn (EH05 and EH08), the groundwater levels rose by about 2-3 m following the significant rainfall events in early 2022, and by up to 4 m in total over the monitoring period.

The groundwater flow direction is inferred to be generally towards the south and west following the natural topography of the rock and ground surface. It should be noted that the groundwater levels will fluctuate over time and would be affected by climatic conditions and artificial influences such as pumping bore water and irrigation.

## 9.2 Earthworks

### 9.2.1 Excavation conditions

Excavation across the site is likely to encounter asphaltic concrete (AC) and concrete pavement as well as brick pavers where existing roads and footpaths are present. Below grass-covered areas, a root-affected fill in the upper 0.1 m is expected to be underlain by sandy fill with ripped sandstone (gravel, cobble and boulder-sized sandstone) and then natural sand. Hawkesbury sandstone is expected at depths greater than the proposed building floor levels and deeper than the levels required for detailed excavation of proposed lift pits, services and the infiltration tank.

Excavation of the AC and brick pavements, fill and natural sandy soil should be achievable using conventional earthmoving equipment. Excavation of concrete pavements and footpaths would generally require excavation using hydraulic rock hammers (i.e. impact breakers) for effective excavation. Large sandstone boulders within the fill material may also require rock hammers to break them down to smaller sizes for transport or re-use.

### 9.2.2 Groundwater

The groundwater level monitoring to date has measured groundwater level fluctuations over more than four years with significant rainfall events. Following prolonged rainfall, the groundwater levels are expected to remain below the anticipated earthworks cut levels for the proposed building FFLs and pavements, and below the anticipated excavation depths of the localised lift pit excavations and a possible 2 m deep infiltration tank to the north of the site.

It is noted that Douglas cannot accurately predict or guarantee future groundwater levels due to the impacts of climate change, construction of future basement developments in proximity to the site potentially causing additional damming effects, daily pumping by UNSW from water bores around the lower campus, irrigation of the campus and other variables or unknowns.

Groundwater levels may temporarily rise to shallower depths than measured to date following heavy and prolonged rainfall.

Given the PMF (water) level is at about RL 28.4, which is above the proposed FFLs of Blocks A and B, and above the ground surface at the western end of the site and just below the ground surface at part of the eastern end, it would be prudent for the design of any shallow footings or below ground structures to consider this PMF level as a potential groundwater level. The design groundwater levels should be taken as RL 26.0 for Block A and RL 25.0 for Blocks B and C and their immediate surrounding area. Notwithstanding this, the PMF (water) level at about RL 28.4 should also be considered as an 'upper limit' for a sensitivity case to design of any shallow footings or below ground structures.

If any groundwater disposal off-site is required, it should occur in accordance with current guidelines. Reference should be made to Douglas' contamination report (ref: report 227492.10.R.003) and Groundwater Monitoring Program (ref: report 227492.06.R.002) outlining the level monitoring, testing requirements and acceptance criteria thresholds for groundwater disposal off site.

As the design groundwater levels (excluding the PMF level in flood events) are expected to be below the anticipated excavation levels of localised lift pits and the proposed stormwater infiltration tank, a Groundwater Impact Assessment is considered to not be required for the proposed development.

### 9.2.3 **Ground vibrations**

Excavations through the fill and sands are expected to generate vibrations that are typically within allowable limits for human comfort and structural impacts.

Notwithstanding the above, for any excavation works (including demolition), it will be necessary to use appropriate methods and equipment to keep ground vibrations at neighbouring buildings and structures within acceptable limits. The level of acceptable vibration is dependent on various factors including the type of adjacent building structure (e.g. reinforced concrete, masonry, etc.), its structural condition, founding conditions, the frequency range of vibrations produced by the construction equipment, the natural frequency of the building and the vibration transmitting medium.

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s peak particle velocity (PPV). This is generally much lower than the vibration levels required to cause structural damage to most buildings. The Standard AS/ISO 2631.2 – 2014 "Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration – Vibration in buildings (1 Hz to 80 Hz)" suggests an acceptable daytime limit of 8 mm/s PPV for human comfort.

Given the presence of the adjacent Shalom College and anticipated shallow slabs/footings supported on loose sand, together with a relatively shallow water table, it is suggested that a maximum PPV of 5 mm/s (measured at the foundation level of neighbouring buildings) be provisionally adopted at this site for both architectural and human comfort considerations for 'modern' buildings. In areas further away from the Shalom College and any ancillary structures supported by high-level footings in sand, a higher vibration limit of 8 mm/s PPV may be adopted.

With the presence of numerous in-ground services within and around the site, the acceptable vibration level for these services should be nominated by the utility owner or services consultant.

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

#### 9.2.4 Dilapidation surveys

Dilapidation surveys should be carried out on adjacent buildings, pavements and infrastructure that may be affected by excavation works. The dilapidation surveys should be undertaken before the commencement of any construction works in order to document any existing defects so that claims for damage due to construction related activities can be accurately assessed.

#### 9.2.5 Disposal of excavated material

All excavated materials will need to be disposed of in accordance with the provisions of the current legislation and guidelines including the *Waste Classification Guidelines* (EPA, 2014). This includes fill and natural materials that may be removed from the site. Accordingly, environmental testing will need to be carried out to classify spoil prior to transport from the site. Reference to Douglas' contamination report (ref: report 227492.10.R.001) should be made for further information.

### 9.3 Excavation support

#### 9.3.1 Batter slopes

Where space permits, temporary batters could be formed within the fill and natural soils. This is likely to be the case for the proposed lift pits. The maximum batter slopes recommended for the design of temporary and permanent batters of up to 3 m high and at least 1 m above the groundwater table are presented in Table 8 and apply where batters are not subjected to temporary or permanent surcharge loads. Higher batter slopes or slopes with surcharge loads (or adjacent to existing structures) generally require detailed analysis to assess slope stability aspects.

Permanent batters in soils should be no steeper than 3H:1V and would require long-term erosion protection by way of vegetation cover or shotcrete.

All batter slopes should be inspected by a geotechnical engineer to check their stability at every 1.5 m drop in the excavation depth.

**Table 8: Maximum Batter Slopes for Excavated Slopes**

| Material Description                   | Temporary Batter | Permanent Batter |
|--|------------------|------------------|
| Units 1 and 2<br>Fill and Natural Sand | 1.5H:1V          | 3H:1V            |

### 9.3.2 Retaining / shoring wall types

Depending on the depth of the infiltration tank and required excavation, shoring may be required to provide temporary and permanent excavation support given its proximity to Science Road and stormwater mains that are understood to service the large infiltration tank below the Village Green.

Steel sheet piles or shoring boxes may be suitable for the temporary retention/support of shallower excavations above the water table and where there are no movement sensitive structures adjacent to the excavation, as is expected for the proposed infiltration tank location. Any sheet piles should not remain permanently in ground as this will reduce the effectiveness of the infiltration tank, particularly as rock is indicated to be relatively shallow below the proposed tank location.

### 9.3.3 Retaining / shoring walls design

The design of cantilevered retaining/shoring walls or walls restrained with one row of ground anchors / bracing should be based on a triangular earth pressure distribution using the earth pressure coefficients provided in Table 9. 'Active' earth pressure coefficient ( $K_a$ ) values may be used where some wall movement is acceptable. 'At Rest' earth pressure coefficient ( $K_o$ ) values should be used where the wall movement needs to be limited. A suitable factor of safety (e.g. 2.5 – 3) should be adopted when using the ultimate passive pressure value, so as to limit wall movements.

**Table 9: Design Parameters for Shoring / Retaining Walls**

| Material                                       | Unit Weight (kN/m <sup>3</sup> ) | Earth Pressure Coefficient |                   | Ultimate Passive Pressure Coefficient ( $K_p$ ) or Passive Earth Pressure ( $P_p$ )(kPa) |
|--|----------------------------------|----------------------------|-------------------|--|
|  |                                  | Active ( $K_a$ )           | At Rest ( $K_o$ ) |  |
| Sandy Fill, Natural Sandy Soil (Units 1 and 2) | 20                               | 0.4                        | 0.6               | $K_p = 2.5^1$  |

Notes: All values above assume a level surface behind the wall.

<sup>1</sup>  $K_p$  applies 0.5 m below the bulk excavation level to account for possible nearby excavations, accidental over-excavation.

For walls with more than one row of ground anchors (or bracing / propping), the shoring can be designed using a rectangular or trapezoidal earth pressure distribution. For preliminary design purposes a trapezoidal earth pressure distribution with a maximum pressure calculated based on 4H kPa, where H is equal to the retained height of soil, may be adopted. The maximum pressure should be increased to 6H to 8H where wall movement needs to be reduced, depending on the sensitivity of any adjacent structures or utilities (i.e. behind the top of the shoring wall). In each case, the maximum pressure generally acts over the central 60% of the wall height, reducing to zero at the top and base of the shoring wall.

Additional surcharge loads such as new and existing footings, construction loads, traffic loads, sloping ground surfaces, etc., must be allowed for in the design, and applied as a rectangular earth pressure distribution over the depth of influence.

The earth pressure loading described above does not include hydrostatic pressures.

Below ground structures such as lift pits should be designed as tanked (i.e. waterproof) retention structures to mitigate the risk of groundwater ingress. This would also reduce the requirement for collection and disposal of groundwater inflow (if any occurs above design groundwater level).

#### 9.3.4 Ground anchors

Temporary and/or permanent ground anchors may be required to support the shoring walls for the proposed infiltration tank, lift pits and building cores, and more so to resist uplift forces for a tower crane for constructing the proposed buildings. For sheet piles or shoring boxes, internal steel struts/braces are a feasible alternative to ground anchors in sand.

Ground anchors are typically inclined at about 10° to 20° below the horizontal, have a free length equal to or greater than the height of the anchor above the base of the excavation and have a minimum free length of 3 m. A minimum bond length of 3 m should also be used.

The design of temporary and permanent ground anchors within loose sand and medium dense (or denser) sand may be based on a friction angle ( $\phi'$ ) of 28° and 33°, respectively. Limited anchor load capacity can be achieved in loose sand, and secondary grouting of the sand within the bond length may be considered to improve the anchor load capacity.

The buoyant weight of the sand overburden must be considered in the calculation of bond stresses based on the friction angle and effective unit weight of the soil overburden, and in particular noting that the infiltration tank construction can coincide with the shallower PMF level.

Movement of anchors in sand is common and care should be taken if anchors are installed under existing services to minimise disturbance to the foundation materials. The anchors will need to be carefully positioned and possibly inclined at steeper angles to avoid existing in-ground services. Sand anchors should be installed and tested only by experienced and reputable specialist anchoring contractors. Casing would likely be required for anchors in sand, particularly below the groundwater to prevent collapse and possible damage to adjacent properties.

The design of temporary and permanent ground anchors into rock, as may be required to resist localised uplift forces for a tower crane, particularly at the eastern end where rock is shallower, may be undertaken using the maximum bond stresses given in Table 10.

**Table 10: Bond Stresses for Anchor Design in Rock**

| <b>Material Description</b>  | <b>Maximum Allowable Bond Stress (kPa) <sup>1</sup></b> | <b>Maximum Ultimate Bond Stress (kPa) <sup>1</sup></b> |
|--|---|--|
| Unit 3 – Variably Low to Medium and Medium to High strength Sandstone with Very Low Strength Bands | 150   | 300  |
| Consistent Medium strength Sandstone or stronger (Units 4 and 5)                                   | 500   | 1,000  |

Notes: <sup>1</sup> For vertical anchors designed to resist uplift forces, cone pull-out failure mechanism(s) with a cone apex angle of 90 degrees should also be checked.

Where vertical anchors are required (e.g. for crane tower pads), anchor design should consider all potential failure mechanisms within the surrounding sand.

After installation, all anchors should be proof stressed to 125% of their nominal Working load and locked-off no higher than 70% of the Working load. Periodic checks should also be carried out throughout the construction phase to ensure that the lock-off load is maintained and not lost due to creep or other causes.

Inspection of the ground anchor installation (i.e., drilling, cleaning, grouting, stressing and testing) should be undertaken by a geotechnical engineer to confirm the ground conditions, installation processes and testing are suitable.

## 9.4 Foundations

### 9.4.1 Design for axial loading

Given the variable strength of the upper sandstone bedrock (i.e. Unit 3), together with the anticipated relatively large building column loads for the proposed multistorey buildings, it is recommended that the buildings are uniformly supported within the consistent medium strength sandstone (Unit 4) or high strength sandstone (Unit 5).

Lightly-loaded structures such as external garden bed walls, light / CCTV camera poles etc. may be supported by pile footings founded below the uncontrolled fill and loose sand, in natural medium dense (or denser) sand or Unit 3 rock, depending on the site location and proposed structure. It is not recommended to support structures in very loose and loose sand due to their limited bearing capacity and susceptibility to long-term erosion and excessive settlement, particularly with a fluctuating groundwater table. The design bearing pressure of footings founded in sand depends on the footing dimensions, embedment depth and proximity to potential groundwater, and therefore, the design of footings in sand should be undertaken on a case-by-case basis.

The use of CFA grout-injected or concrete-injected piles is recommended for drilling below the water table and to prevent the sandy fill and natural sand from collapsing into the pile holes. The CFA piling rig would need to be powerful enough to drill a substantial socket into the underlying medium strength and possibly high strength sandstone. It is noted that it may be difficult for a CFA piling rig form long sockets in the Unit 5 (high strength) sandstone, and therefore, piles socketed primarily into Unit 4 sandstone may need to be adopted.

The design of bored or CFA piles founded in sandstone bedrock may be based on the parameters provided in Table 11.

**Table 11: Parameters for Foundation Pile Design**

| Foundation Stratum                    | Allowable Bearing Pressure (Serviceability) |   | Ultimate Bearing Pressure |   | Vertical Young's Modulus $E_v$ (MPa) | Poisson's Ratio $\nu$ (-) |
|---------------------------------------|---|---|---------------------------|---|--------------------------------------|---------------------------|
|                                       | End Bearing (kPa)                           | Shaft Adhesion (Compression) (kPa) <sup>1,2</sup> | End Bearing (kPa)         | Shaft Adhesion (Compression) (kPa) <sup>1,2</sup> |                                      |                           |
| Unit 3<br>VL/L-M/M-H<br>Sandstone     | 1,500                                       | 100   | 3,000                     | 200   | 100                                  | 0.3                       |
| Unit 4<br>M<br>Sandstone              | 3,500                                       | 300   | 20,000                    | 700   | 500                                  | 0.25                      |
| Unit 5<br>H<br>Sandstone <sup>3</sup> | 6,000                                       | 600   | 40,000                    | 1,400   | 1200                                 | 0.25                      |

- Notes:
- 1 Shaft adhesion applicable to the design of bored or CFA piles, uncased over the rock socket length, where adequate sidewall cleanliness and "R2" or better roughness is achieved.
  - 2 Where piles are also required to resist uplift, the shaft adhesion value (tension) should be taken as 70% of shaft adhesion value (compression). Cone pull-out failure mechanisms should also be checked.
  - 3 Design parameters for high strength sandstone may be used provided further rock-cored boreholes are completed on an approximate 25 m grid spacing and to a depth of at least 5 pile diameters below the foundation pile base.
- VL = Very Low, L = Low, M =Medium, H = High (rock strengths)

It is recommended that rock-cored boreholes are undertaken across the site and extend to at least 5 pile diameters below the pile base to confirm the founding rock stratum. If high strength parameters are preferred for foundation design, then rock-cored boreholes should be drilled at a minimum 25 m grid spacing, but subject to variability and rock quality encountered.

Foundations proportioned on the basis of the allowable bearing pressures in Table 11 would be expected to experience total settlements of less than 1% of the pile diameter under the applied working load.

For the design of piles using the ultimate values provided in Table 11, a geotechnical strength reduction factor ( $\phi_g$ ) should be determined by the designer as this is based on a number of individual risk ratings (IRRs) for the site conditions and level of investigation, design and installation of piles. Douglas can assist with the IRRs for the site conditions and level of geotechnical investigation. The serviceability assessment should be based on using geotechnical parameters that are appropriately selected and to which no reduction factor is applied.

It is noted that CFA piling involves a blind drilling technique such that a geotechnical engineer cannot complete direct visual and tactile assessment of rock cuttings returned from the auger, unlike bored pile drilling. Therefore, the CFA piling contractor should certify the design and construction of the CFA piles. Additional rock-cored boreholes should be drilled at the location of key column/heavier-loaded locations.

Care will be required by the piling contractor to avoid "decompression" of the upper fill and sand. Decompression or 'flighting' involves the drilling auger 'drawing in' the surrounding soils, usually due to a sudden decrease in the rate of penetration relative to auger rotation, as may occur upon penetrating higher strength rock below sandy overburden soils. Decompression can lead to settlement of the adjacent ground surface and damage to existing structures and utilities founded within sand. For this and other reasons, only experienced piling contractors with suitable high-powered drilling rigs should be considered for this project. The use of CFA piling rigs fitted with outer temporary (segmental) casing may also be adopted to reduce the risk of decompression.

#### 9.4.2 **Design for lateral loading**

For lateral pile design with socket lengths within natural soil (overburden) and bedrock, the parameters provided in Table 12 may be adopted for preliminary design.

For serviceability design, the deflection performance of pile foundations may be estimated using the horizontal Young's modulus values ( $E_h$ ) given in Table 12, together with typical values of the horizontal modulus of subgrade reaction ( $K_h$ ), where the pile diameter ( $d$ ) is in units of mm.

The modulus of subgrade reaction is not an intrinsic soil property. The values are affected by the size of the loaded area, the magnitude of the loads and displacements, in addition to the ground conditions. The values provided in Table 12 are therefore provided for preliminary design purposes, only. For detailed design or to analyse the lateral movement of structural elements (i.e. foundation piles and caps, as well as building cores) more accurately, numerical modelling is recommended.

**Table 12: Preliminary lateral design parameters for pile foundations**

| <b>Foundation Stratum</b>  | <b>Horizontal Young's Modulus <math>E_h</math> (MPa)</b> | <b>Horizontal Modulus of Subgrade Reaction, <math>k_h</math> (kPa/mm) <sup>1</sup></b> | <b>Ultimate Horizontal Limiting Pressure (kPa) <sup>1</sup></b> |
|--|--|--|---|
| Unit 2<br>Loose Natural Sand<br>(SPT N value 5 - 10 and at least 2m below ground surface)                          | 5 - 8  | 5,000 - 8,000/d  | -   |
| Unit 2<br>Loose to Medium Dense (or denser) Natural Sand<br>(SPT N value >10 and at least 2m below ground surface) | 8 - 12   | 8,000 - 12,000/d   | 300   |
| Unit 3<br>VL/L-M/M-H Sandstone   | 50 -75   | 50,000 - 75,000/d  | 1,500   |
| Unit 4<br>M Sandstone  | 250 - 375  | 250,000 - 375,000/d  | 7,000   |
| Unit 5<br>H Sandstone 2  | 600 - 900  | 600,000 - 900,000/d  | 15,000  |

Notes: General Notes

For piles located within 3 times the height of a retaining wall or excavation, lateral restraint from soil and/or rock to commence 0.5 m below the adjacent retaining wall base level.

For soil, the above modulus values are valid for a typical range of operating strains (i.e.  $\leq 1\%$  strain) and within the elastic stress range; no effect of pile interaction is considered and larger modulus values may be appropriate for small strain circumstances (e.g. dynamic or earthquake loading).

Ultimate limiting pressure for soils based on a minimum embedment depth of 2 m within the laterally loaded strata and minimum pile diameter of 0.6 m. The upper 2 m of soil from ground surface level should be ignored in calculations of lateral capacity using these values.

d = pile diameter in mm.

VL = Very Low, L = Low, M =Medium, H = High (rock strengths).

Specific Notes

1 - Structural yielding of pile to be considered by structural engineer.

2 - Stratum to be confirmed by additional boreholes.

It should also be noted that the above parameters (both for assessment of lateral load resistance and deflection) are ultimate values and do not incorporate a factor of safety. Because the stress-strain relationship curve for lateral loading is not linear, relatively large strains are required to mobilise full passive pressure, but only relatively small strains are required to mobilise approximately half the full passive pressure, therefore it would be prudent to incorporate a factor of safety of at least 2.

Sensitivity analyses should be performed by the structural engineer using values 50% to 200% of the reported values in Table 11.

## 9.5 Earthquake design

A Hazard Factor ( $Z$ ) of 0.08 would be appropriate for preliminary design in accordance with Australian Standard AS 1170.4 – 2024 Structural design actions – Part 4: Earthquake actions in Australia.

When considering the current borehole information, the site sub-soil class is Class  $D_e$  ("Deep or Soft Soil site) considering the upper sand profile in some of the boreholes had SPT  $N$  values  $<6$ .

Further analysis could be carried out to assess whether a Class  $C_e$  (Shallow Soil Site) can be justified but this will require cone penetration testing (CPT) once the site is more readily accessible to a test truck and further analysis. CPT will provide continuous repeatable strength data on the soil profile using an instrumented electric friction cone penetrating the soil profile at a constant rate of approximately 2 cm per second.

## 9.6 Soil aggressivity

Based on the results of the chemical analysis and reference to Tables 6.4.2(C) and 6.4.3(C) of AS 2159 Pile design and installation – 2009, the site soils may be assumed to have an exposure classification of 'mild' for buried concrete elements and 'non-aggressive' for buried steel elements, if 'Soil Conditions A' (i.e., high permeability soils that are in groundwater) are considered. Given that the groundwater level may rise within the high permeability sandy soils in the long term of the project life, 'Soil Conditions A' were adopted.

## 9.7 Subgrade preparation

From a geotechnical perspective, the existing sandy fill and natural sand are likely to be suitable for re-use as engineered fill on site provided oversized material (i.e., particles greater than 80 mm) and any deleterious material (e.g. organics, tree roots), if present, is removed. The suitability of re-using site-won fill and natural soil should also be considered from a contamination perspective, particularly in the vicinity of BH102 where an asbestos fragment was encountered at a depth of 0.9 m to 1.0 m in the sandy fill (refer to Douglas' contamination reports 227492.10.R.001 and 227492.10.R.003).

Subgrade preparation measures for pavements, paved public domain areas and slabs on grade should include:

- Removal of any fill and natural soil to a minimum depth of 0.6 m below design subgrade level or the current ground surface level, whichever is deeper, to construct a uniform, engineered fill layer of at least 0.6 m thickness over the underlying loose sand and possibly remnant uncontrolled fill.

It is noted that leaving uncontrolled fill in situ below slabs-on-grade involves accepting a higher level of risk of possible differential and long-term settlement. Alternatively, all uncontrolled fill would need to be removed and replaced as engineered fill to manage this risk.

The engineered fill layer may also be incorporated into the working platform(s) for heavy tracked plant such as piling rigs (noting that a thicker engineered fill layer may be required to support the piling rigs and will be subject to further geotechnical analysis once the piling rig loads are known);

- Proof roll the exposed surface (soil only) using a minimum 5-tonne roller in non-vibration mode. The subgrade should be rolled a minimum of six times with the last two passes observed by an experienced geotechnical engineer to detect any 'soft' spots. Any loose / soft areas identified during proof rolling should be removed as directed by the geotechnical engineer;
- Placement of engineered fill in loose layer thicknesses of 200 – 250 mm (dependent upon compaction equipment used) and compacted to:
  - For slabs on grade, a dry density ratio (DDR) of at least 98% relative to Standard compaction or similarly a Density Index (DI) of 75%, with moisture contents maintained within 2% of the Standard optimum moisture content;
  - For on grade pavements, a DDR of at least 100% relative to Standard compaction or similarly a DI of 80%, with moisture contents maintained within 2% of Standard optimum moisture content; and
  - New fill should be free of oversize particles (>80 mm) and deleterious material. The use of a readily compacted, essentially non-plastic material such as medium to high strength ripped sandstone or densely graded basecourse (DGB) material would generally be appropriate. Such materials are likely to have a CBR value greater than 12%.
- Density testing in accordance with AS 3798 - 2007 "Guidelines for earthworks for commercial and residential developments" should be undertaken to verify the above compaction criteria is achieved.

## 9.8 Pavements

### 9.8.1 General

It is understood that a new pavement will be constructed for the Science Road extension from the current Science Road to Barker Street, with pavers within the public domain walkways around and between the buildings.

The CBR laboratory results on samples of sandy fill and natural sandy soil (i.e. the materials below the existing pavement "basecourse" layer in pavement areas, or beyond existing pavement areas) indicated CBR values in the range of 10% to 70%. Some of the CBR values are high for such material, and this is most likely due to the "hard" inclusions gravel within the tested soil samples. Based on Douglas' experience with CBR results on sandy fill and natural sand in the area, preliminary design of pavements and slabs on grade founded on engineered sandy fill and / or natural sand subgrade prepared in accordance with Section 9.7 of this report should be based on a design subgrade CBR of 10%.

It is noted that the "basecourse" layer at BH101/0.25-0.4 m (below the concrete pavement) had a lower CBR value of 8%. It is assumed that this layer is not part of the preliminary pavement thickness provided below, and this "basecourse" layer will be removed and replaced with a material with greater CBR as part of the new pavement design by ARUP.

If imported engineered fill comprising a crushed, durable rock is used to replace the site-won fill, then a higher CBR value and Young's modulus may be adopted. In this case, the effective CBR value would need to be evaluated and ultimately depends on the CBR value and layer thickness of the imported, engineered fill.

The design CBR value assumes all pavements are protected by adequate surface and subsoil drainage to minimise the risk of water infiltration and softening of subgrade and pavement materials.

Further inspection of the exposed subgrade soils should be carried out by an experienced geotechnical engineer during the subgrade preparation of the pavement.

### 9.8.2 Preliminary pavement thickness

It is anticipated that the on-grade pavements will be flexible pavements, similar to existing pavements, and accessible to vehicles of size from Class 1 Short Vehicles to Class 5 Four Axle Trucks as defined in Austroads 2017.

Based on a design CBR of 10% for the subgrade and provided subgrade preparation is carried out in accordance with Section 9.7, an elastic modulus of 35 MPa may be adopted for the subgrade material for short term transient loading and an elastic modulus of 28 MPa may be adopted for long term loading, in accordance with guidelines for Industrial Floors and Pavements 1999.

A preliminary pavement thickness design for the Science Road extension along the western site boundary has been undertaken using empirical methods in general principles outlined within Austroads 2017 Guide to Pavement Technology Part 2 Pavement Structural Design. It is noted that this does not relate to the existing Science Road and Southern Drive pavement areas.

In the absence of a design traffic loading at this stage, we have assumed an equivalent standard axle (ESA) of  $10^5$ , and a design CBR of 10% for the subgrade to provide a preliminary pavement thickness for a lightly trafficked, granular pavement with thin bituminous surfacing (i.e., a flexible, asphaltic concrete pavement). A summary of the pavement materials, thickness and material properties are provided in Table 11.

A thicker asphalt surface or concrete pavement may be required in areas where trucks are turning.

A detailed design of pavement thickness should be undertaken at a later stage by a civil engineer and once the design traffic loadings and pavement finishes have been confirmed.

**Table 13 Preliminary pavement thickness design <sup>1</sup>**

| <b>Material Layer</b>                   | <b>Minimum Thickness (mm)</b> | <b>Vertical Elastic Modulus (MPa)</b> | <b>Minimum Design CBR (%)</b> | <b>Minimum Compaction</b>   |
|---|-------------------------------|---------------------------------------|-------------------------------|---|
| Asphaltic Concrete                      | 30                            | 2,000                                 | -                             | Dependent on mix design   |
| Crushed Rock Base (unbound)             | 100                           | 300                                   | 80                            | 100% Modified   |
| Crushed Rock Sub-Base (unbound)         | 100                           | 250                                   | 30                            | 100% Modified   |
| Subgrade Replacement, Granular Material | -                             | 100                                   | 10                            | 100% Standard or 80% Density Index                                |
| Subgrade                                | -                             | 100                                   | 10                            | Subgrade prepared in accordance with Section 10.8 of this report. |

Notes: <sup>1</sup> For lightly trafficked roads with asphaltic concrete (AC) less than 40 mm thick with design traffic ESA of 10<sup>5</sup>.

All granular pavement base and subbase materials are to comply with Transport for New South Wales (TfNSW) QA Specification 3051.

It is noted that long term pavement performance is often dictated by construction stage works, and therefore that careful attention should be made to adopting appropriate construction processes, including quality controls, inspections and testing, to ensure that the subgrade is suitably prepared, not overloaded during construction and that the pavement is constructed in accordance with all requirements.

### 9.8.3 Drainage

Water within the pavement and upper subgrade materials will reduce pavement performance, and allowance must be made for appropriate surface and subsurface drainage to maintain and protect the pavement and subgrade, in order to achieve the pavement design life. This advice also applies to slabs on grade.

It is recommended that the subsurface drain should generally extend to at least 0.5 m below subgrade level on both sides of the road pavement. Such drainage could potentially be integrated with other drainage works, such as bedding for stormwater lines.

If a final AC layer is not placed immediately following pavement construction, it is suggested that diversion mounds and appropriate temporary drainage measures be provided to prevent excessive water flows running into the pavement (as may occur where the 'lip' of permanent kerbing and drainage measures acts as a dam to water movement). Such infiltration may result in premature pot-holing and pavement failure.

## 9.9 Building slab

Subgrade preparation for building slabs-on-grade should be undertaken in accordance with Section 9.7 of this report. A minimum 0.3 m thick layer of durable crushed rock such as DGB20 or high strength sandstone should be compacted over the sand to provide a uniform bearing layer and to confine and compact the underlying sand. The subbase layer may be incorporated into the working platform for tracked piling rigs and other plant. Provided the recommended subgrade preparation is undertaken, the design of the building slabs may be based on a CBR of 10%, however, the CBR should be confirmed with an inspection and possibly more CBR tests of the material exposed at bulk excavation level for the buildings.

Hydrostatic uplift pressures will apply to the base of any watertight (i.e., tanked) buried structures, lift pit overruns or pavements below groundwater. These structures should be designed to resist hydrostatic uplift pressures that may eventuate from the PMF (water) level at about RL 28.4, and this may include the design of vertical ground anchors or piles in addition to the weight of the new structure.

## 9.10 Stormwater management system (infiltration tank)

It is understood that stormwater collected from this development is planned to be discharged to a relatively large infiltration tank below the Physics Lawn.

Based on groundwater level monitoring and hydraulic testing completed at the Physics Lawn and in surrounding areas, a design groundwater level of RL 25.0 and a hydraulic conductivity of  $6 \times 10^{-5}$  m/s (for natural sand only, below at least RL 27.0) may be adopted for the design of the infiltration tank. It is noted that if UNSW reduce pumping rates from water bores at the lower campus in future, this will likely raise groundwater levels and may pose a risk for the infiltration tank functionality and performance.

It is recommended that the invert level of the tank is designed to be as far as practical above the design groundwater level of RL 25.0 to increase the effectiveness of subsoil infiltration. Typically, the tank invert level is founded at least 1.5 -2 m above the design groundwater level, although this will depend on the volume of stormwater to discharge and infiltration rate/hydraulic conductivity to reduce the risk of infiltration process stopping. A tank overflow system to nearby stormwater system should be included in the design for contingency.

A shallow depth tank would also reduce the amount of excavation and possibly allow for temporary batters to be constructed for excavation support. Consideration of relocating the tank further away from adjacent roads and in-ground services would also make the construction of temporary batters more feasible.

## 9.11 Working platforms

Working platforms will be required where heavy loads such as from tracked piling rigs or mobile outrigger cranes are used during construction. Given the loose sand present, working platforms are expected to be relatively thick and will require a site-specific geotechnical assessment for the proposed plant. The working platforms typically require the use of additional layers of durable, high strength crushed rock or similar, possibly with the use of steel road plates to further reduce the pressure applied to the ground or any buried services.

### 9.12 **Acid sulfate soils and saline soils**

Given the site location, mapping, subsoil and groundwater conditions encountered as well as Douglas' experience at nearby sites, acid sulfate soils and saline soils are not expected to be present at this site and therefore management plans for such soil conditions are not required for construction purposes.

### 9.13 **Further Investigation**

Once the site is readily accessible to testing equipment, further investigations are recommended as follows:

- Rock-cored boreholes spread across the site to further characterise the subsurface soil/rock conditions;
- Additional rock-cored boreholes penetrating the Unit 5 (high strength) sandstone should also be considered for key column locations for CFA piling methods. This will enable more robust and accurate pile design to be undertaken and reduce the risk of variation in rock depth and strength necessitating re-design during construction;
- Cone penetration tests (CPTs) spread across the site to assess the soil density for the design of slabs on grade, lateral design of the building foundation piles, possible ground anchors as well as for earthquake design (i.e. seismic site classification) purposes.

### 9.14 **Conclusion**

The geotechnical subsurface conditions and risks identified in this report can be managed for the proposed development by implementing the advice contained within this report, including the mitigation measures identified for design and construction stages.

### 9.15 **Mitigation measures**

A number of mitigation measures for geotechnical risks associated with the proposed development are provided in this report and are identified in Table 14.

**Table 14: Mitigation measures addressed in this report**

| <b>Project Stage<br/>Design (D)<br/>Construction (C)<br/>Operation (O)</b> | <b>Geotechnical Risk</b>  | <b>Mitigation Measure</b>   | <b>Relevant Section of Report</b> |
|--|---|---|-----------------------------------|
| D / C  | Excavation support and stability.   | <i>Design parameters for batter slopes, retaining walls and ground anchors based on site-specific investigation / laboratory testing of ground conditions.<br/>Geotechnical inspections of batter slopes and ground anchor installation.</i>          | Sections 9.3.1 to 9.3.4           |
| D / C  | Neighbouring Shalom College building supported by high-level footings in sand                                   | <i>Adopt a lower vibration limit if neighbouring buildings have high-level footings in sand (as anticipated).</i>   | Sections 4.6, 9.2.3               |
| C  | Ground vibrations induced by construction plant and by piling into rock.  | <i>Undertake vibration trials and possibly on-going vibration monitoring.</i>   | Sections 9.2.1 and 9.2.3          |
| D / C  | Poor foundations for footings, excessive settlement of footings.  | <i>Design parameters for footing design based on site-specific investigation of ground conditions.<br/>Undertake further investigations across the site once readily accessible.<br/>Geotechnical inspections of foundations during construction.</i> | Sections 9.4, and 9.13            |
| D / C  | Poor subgrade for slabs and pavements on-grade.   | <i>Design parameters for subgrade and pavements based on site-specific investigation / laboratory testing of ground conditions.<br/>Subgrade preparation, earthworks inspection and testing.<br/>Installation of drainage.</i>                        | Sections 9.7, 9.8 and 9.9         |
| D / C  | Fluctuating groundwater levels and probable flood, groundwater inflow to below ground structures, lifts, tanks, | <i>Groundwater level monitoring for minimum 3 months completed as part of this investigation, refer Groundwater Monitoring Program.</i>   | Section 4.4, 6.2.2 and 9.2.2      |

| <b>Project Stage</b><br><b>Design (D)</b><br><b>Construction (C)</b><br><b>Operation (O)</b> | <b>Geotechnical Risk</b>  | <b>Mitigation Measure</b>   | <b>Relevant Section of Report</b> |
|--|---|---|-----------------------------------|
|  | groundwater management.   |   |                                   |
| D / C / O  | Rise of groundwater levels due to cessation of water extraction/pumping from water bores and/or flood events. | <i>Tanked below ground structures such as lift pits, reducing collection and disposal of groundwater inflow (if any occurs above design groundwater level).</i> | Sections 9.2.2 and 9.3.3.         |
| D / C  | Impact on adjacent structures.  | <i>Vibration trials and possibly on-going vibration monitoring induced by construction plant, Dilapidation Surveys, stormwater management.</i>                  | Sections 9.2.3, 9.2.4, 9.10.      |

## 10. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project (Proposed UNSW N13 Barker Street Student Accommodation) at 39 Barker Street, Kensington NSW in line with Douglas' proposals 227492.06.P.001.Rev1 dated 11 November 2024 and 227492.06.P.002.Rev0 dated 20 August 2025 and acceptance received from University of New South Wales. The work was carried out under a Supply Agreement dated 28 March 2025. This report is provided for the exclusive use of University of New South Wales for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

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

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

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

---

## **Appendix A**

About This Report

## Introduction

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

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

## Copyright

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

## Borehole and Test Pit Logs

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

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

## Groundwater

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

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

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

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

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

## Reports

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

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

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

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

## About this Report

### Site Anomalies

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

### Information for Contractual Purposes

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

### Site Inspection

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

intentionally blank

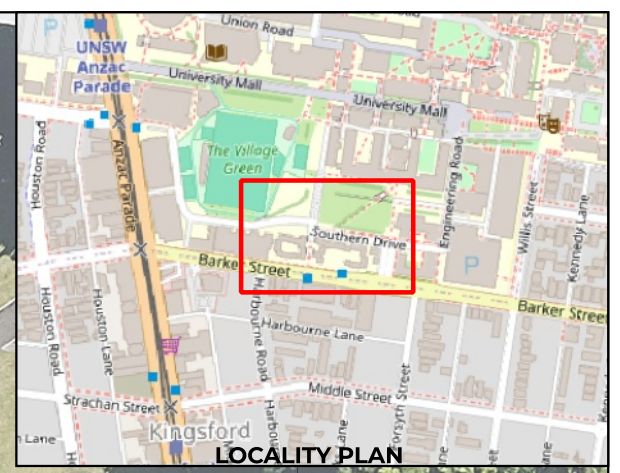
---

## **Appendix B**

Drawings

**LEGEND**

- Approximate Site Boundary
- Proposed Building Footprint (Approximate)
- Proposed Science Road Extension
- Approximate Extent of Site Works
- + Cored Borehole
- + Augered Borehole
- + Previous Investigation Cored Borehole (Proj. 86763.00, 2019)
- + Previous Investigation Cored Borehole (Proj. 14319C, 1997)
- ▲ Interpreted Geotechnical Cross Section
- MW** Monitoring Well



| REV | DESCRIPTION/COMMENT | DATE       | DRAWN BY |
|-----|---------------------|------------|----------|
| 0   | INITIAL ISSUE       | 09.09.2025 | IH/EC    |
| 1   | UPDATED BASEMENTS   | 30.09.2025 | EC       |
| 2   | UPDATED BASEMENTS   | 01.12.2025 | MN       |

SCALE: 1:600 @ A3

**Douglas**  
PARTNERS

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

CLIENT:  
**The University Of New South Wales**

NOTE:  
1: Basemap from Metromap (dated 13.03.2025)  
2: Coordinates for Previous Investigation Boreholes transformed from GDA94  
3: Location for BH2 (1997) is approximate only

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:  
**UNSW N13 Barker Street Development**  
PROJECT ADDRESS:  
**Barker Street, Kensington**

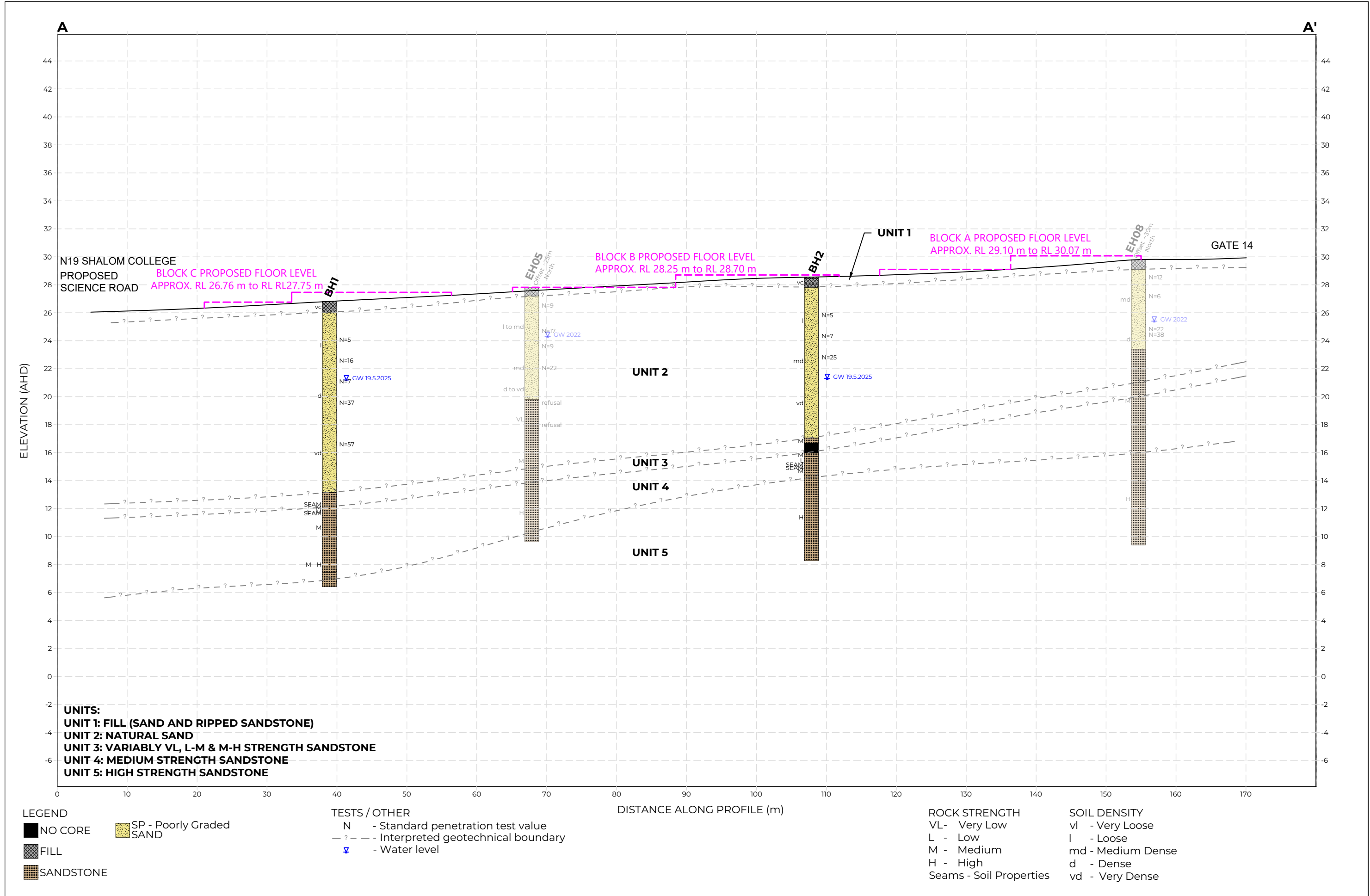
DRAWING TITLE:  
**Test Location Plan**

PROJECT NO:  
**227492.06**

DRAWING NO:  
**1**

REVISION:  
**2**

\\pays\dms02\Projects\227492.06 - KENSINGTON, Barker Street - UNSW\70 Drawings\7.3 CG\15\227492.06.dwg



| REV | DESCRIPTION/COMMENT | DATE       | DRAWN BY |
|-----|---------------------|------------|----------|
| 0   | INITIAL ISSUE       | 13.06.2025 | EC       |
| 1   | UPDATED BASEMENTS   | 01.10.2025 | EC       |

SCALE: 0 5 10 15 20  
 1:500 @ A3  
 Vertical Exaggeration = 2.0

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

CLIENT:  
**The University of New South Wales**

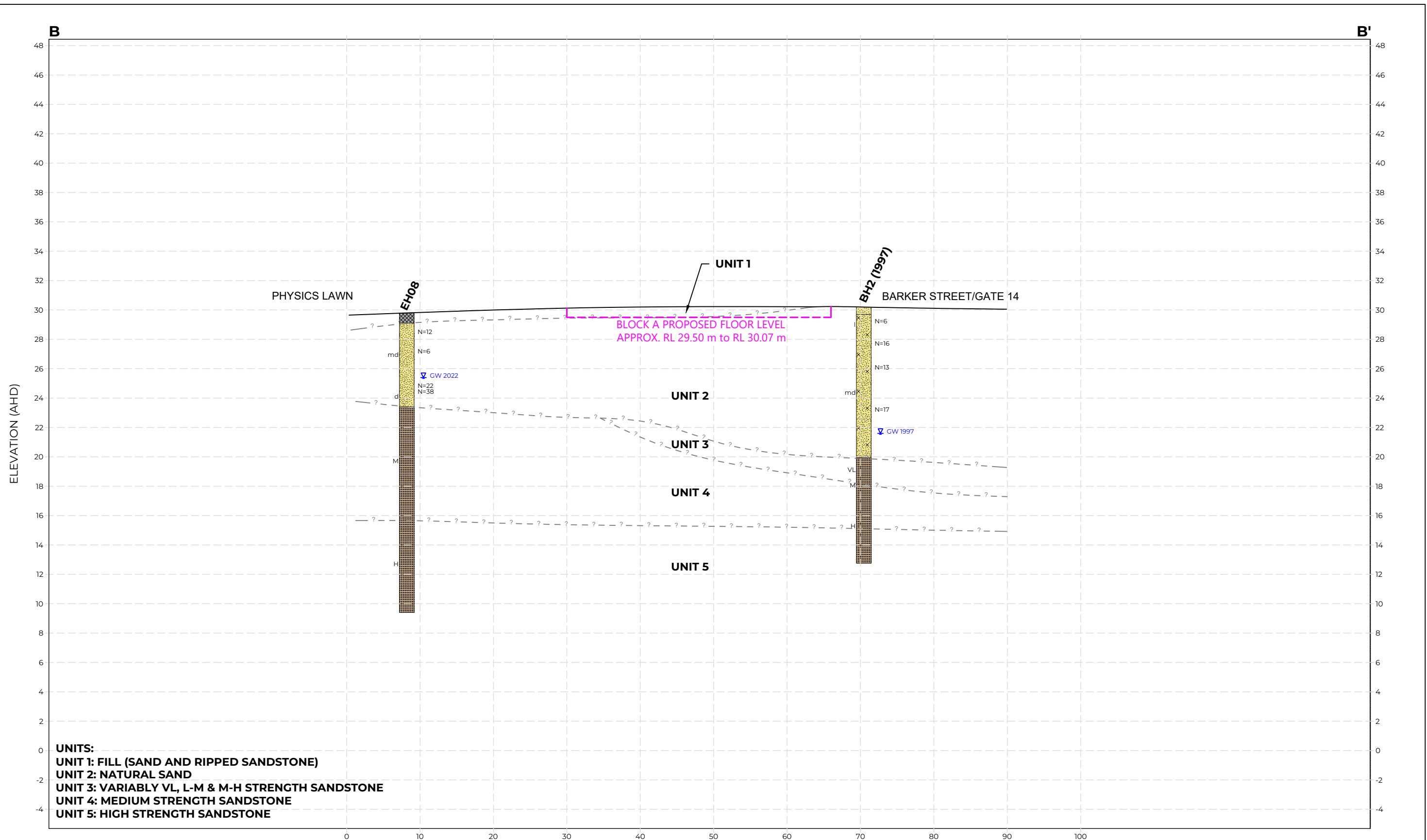
NOTES  
 1. Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.  
 2. Summary logs only and should be read in conjunction with detailed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

PROJECT NAME:  
**UNSW N13 Barker Street Development**  
 PROJECT ADDRESS:  
**Barker Street, Kensington**

DRAWING TITLE:  
**INTERPRETED GEOTECHNICAL CROSS SECTION A-A'**

PROJECT No:  
**227492.06**  
 DRAWING No:  
**2**  
 REVISION:  
**1**

\\pdpaynas02\Projects\227492.06 - KENSINGTON, Barker Street, UNSW\7.0 Drawings\7.2 Out\227492.06.D.002-003.Rev1\_Cross Section A-B.dwg



- UNITS:**  
**UNIT 1: FILL (SAND AND RIPPED SANDSTONE)**  
**UNIT 2: NATURAL SAND**  
**UNIT 3: VARIABLY VL, L-M & M-H STRENGTH SANDSTONE**  
**UNIT 4: MEDIUM STRENGTH SANDSTONE**  
**UNIT 5: HIGH STRENGTH SANDSTONE**

**LEGEND**

|  |                   |  |                                |
|--|-------------------|--|--------------------------------|
|  | <b>FILL</b>       |  | <b>SANDSTONE</b>               |
|  | <b>SAND</b>       |  | <b>SP - Poorly Graded SAND</b> |
|  | <b>Silty SAND</b> |  |                                |

**TESTS / OTHER**

|         |                                   |
|---------|-----------------------------------|
| - ? - - | Interpreted geotechnical boundary |
| ▽       | Water level                       |

**ROCK STRENGTH**

|     |          |
|-----|----------|
| VL- | Very Low |
| L   | Low      |
| M   | Medium   |
| H   | High     |

**SOIL DENSITY**

|    |              |
|----|--------------|
| vl | Very Loose   |
| l  | Loose        |
| md | Medium Dense |
| d  | Dense        |
| vd | Very Dense   |

| REV | DESCRIPTION/COMMENT | DATE       | DRAWN BY |
|-----|---------------------|------------|----------|
| 0   | INITIAL ISSUE       | 11.06.2025 | EC       |
| 1   | UPDATED BASEMENTS   | 01.10.2025 | EC       |

SCALE: 1:500 @ A3  
Vertical Exaggeration = 2.0

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

CLIENT:  
**The University of New South Wales**

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

PROJECT NAME:  
**UNSW N13 Barker Street Development**  
 PROJECT ADDRESS:  
**Barker Street, Kensington**

DRAWING TITLE:  
**INTERPRETED GEOTECHNICAL CROSS SECTION B-B'**

|             |                  |
|-------------|------------------|
| PROJECT No: | <b>227492.06</b> |
| DRAWING No: | <b>3</b>         |
| REVISION:   | <b>1</b>         |

---

## **Appendix C**

Current Borehole Logs



## Introduction to Terminology, Symbols and Abbreviations

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

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

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

### Abbreviation Codes

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

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

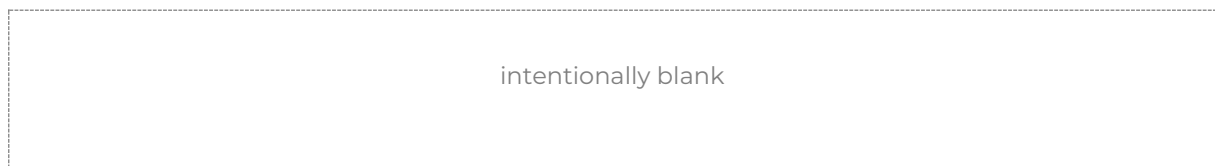
### Data Integrity Codes

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

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

### Graphic Symbols

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





## Introduction

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



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

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

### Particle size designation and Behaviour Model

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

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

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

<sup>1</sup> – refer grain size subdivision descriptions below

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

### Component proportions

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

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

<sup>1</sup> As defined in AS1726-2017 6.1.4.4

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

### Composite Materials

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

## Classification

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

## Soil Name

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

| Component <sup>1</sup> | Prominence in Soil Name         |
|------------------------|---------------------------------|
| Primary                | Noun (eg "CLAY")                |
| Secondary              | Adjective modifier (eg "Sandy") |
| Minor                  | No influence                    |

<sup>1</sup> – for determination of component proportions, refer component proportions on previous page

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

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

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

## Identification of minor components

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

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

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

## Soil Composition

### Plasticity

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

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

### Grain Size

| Type | Particle size (mm) |              |
|------|--------------------|--------------|
|      | Gravel             | Coarse       |
|      | Medium             | 6.7 - 19     |
|      | Fine               | 2.36 - 6.7   |
| Sand | Coarse             | 0.6 - 2.36   |
|      | Medium             | 0.21 - 0.6   |
|      | Fine               | 0.075 - 0.21 |

### Grading

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

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

## Soil Condition

### Moisture

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

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

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

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

### Consistency/Density/Compaction/Cementation/Extremely Weathered Material

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

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

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

#### Consistency (fine grained soils)

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

#### Relative Density (coarse grained soils)

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

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

## Compaction (anthropogenically modified soil)

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

## Cementation (natural and anthropogenic)

| Cementation Term    | Abbreviation Code |
|---------------------|-------------------|
| Moderately cemented | MOD               |
| Weakly cemented     | WEK               |

## Extremely Weathered Material

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

## Soil Origin

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

## Cobbles and Boulders

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

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

intentionally blank



## Rock Strength

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

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

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

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

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

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

## Degree of Weathering

The degree of weathering of rock is classified as follows:

| Weathering Term  | Description  | Abbreviation Code |
|--|--|-------------------|
| Residual Soil <sup>1</sup>                                     | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.   | RS                |
| Extremely weathered <sup>1</sup>                               | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible   | XW                |
| Highly weathered   | The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores. | HW                |
| Moderately weathered   | The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.   | MW                |
| Slightly weathered   | Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.   | SW                |
| Fresh  | No signs of decomposition or staining.   | FR                |
| Note: If HW and MW cannot be differentiated use DW (see below) |  |                   |
| Distinctly weathered   | Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.   | DW                |

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

## Degree of Alteration

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

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

## Degree of Fracturing

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

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

## Rock Quality Designation

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

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

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

## Stratification Spacing

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

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

## Defect Descriptions

### Defect Type

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

### Rock Defect Orientation

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

### Rock Defect Coating

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

### Rock Defect Infill

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

### Rock Defect Shape/Planarity

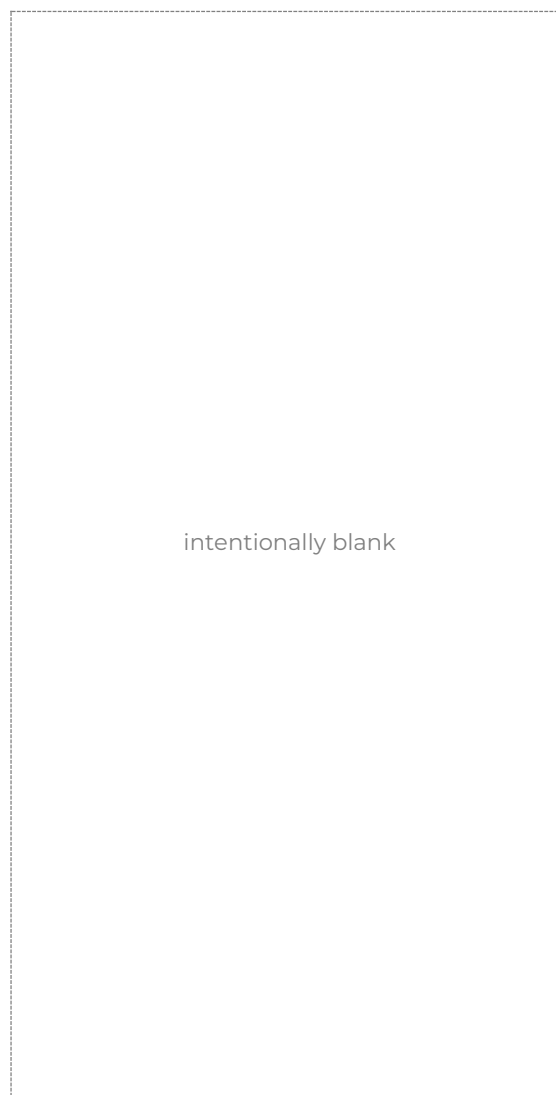
| Term          | Abbreviation Code |
|---------------|-------------------|
| Curved        | CU                |
| Discontinuous | DIS               |
| Irregular     | IR                |
| Planar        | PR                |
| Stepped       | ST                |
| Undulating    | UN              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

### Rock Defect Roughness

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

### Defect Orientation

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





## Sampling and Testing

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

| SAMPLE         |      |          | DEPTH (m)   | TESTING   |                     |
|----------------|------|----------|-------------|-----------|---------------------|
| SAMPLE REMARKS | TYPE | INTERVAL |             | TEST TYPE | RESULTS AND REMARKS |
|                | SPT  |          | 1.0<br>1.45 | SPT       | 4,9,11<br>N=20      |

### Sampling

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

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

<sup>1</sup> – numeric suffixes indicate tube diameter/width in mm

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

### Field and Laboratory Testing

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

| Test Type   | Code |
|---|------|
| Pocket penetrometer (kPa)   | PP   |
| Photo ionisation detector (ppm)   | PID  |
| Standard Penetration Test<br>x/y = x blows for y mm penetration<br>HB = hammer bouncing<br>HW = fell under weight of hammer | SPT  |
| Shear vane (kPa)  | V    |

|  |     |
|--|-----|
| Unconfined compressive strength, (MPa) | UCS |
|--|-----|

Field and laboratory testing (continued)

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

### Groundwater Observations

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

### Drilling or Excavation Methods/Tools

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

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

<sup>1</sup> – numeric suffixes indicate tool diameter/width in mm

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 27.2 AHD  
**COORDINATE:** E:336279.0, N:6245399.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH101  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER |  | CONDITIONS ENCOUNTERED |           |   |   |            | SAMPLE      |             |          | TESTING AND REMARKS |      |          |           |           |                     |
|-------------|--|------------------------|-----------|---|---|------------|-------------|-------------|----------|---------------------|------|----------|-----------|-----------|---------------------|
|             |  | RL (m)                 | DEPTH (m) | DESCRIPTION OF STRATA   | GRAPHIC                                 | ORIGIN (#) | CONSIS. (°) | DENSITY (°) | MOISTURE | REMARKS             | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
|             |  |                        |           | REINFORCED CONCRETE PAVEMENT; with 10-20mm igneous and bricks, steel reinforcement bars.  | [Graphic: Reinforced Concrete Pavement] | NA         | ND          | ND          |          |                     |      |          |           |           |                     |
|             |  | 27                     | 0.25      | FILL / SAND trace silt trace gravel: grey; fine to medium; fine to medium, angular to sub-rounded gravel; igneous slag aggregates (basecourse). | [Graphic: Fill]                         | FILL       |             |             |          |                     |      | 0.25     |           |           |                     |
|             |  |                        | 0.40      | FILL / SAND trace silt trace gravel: pale grey, brown; fine to medium; igneous/slag, ripped sandstone gravel.                                   | [Graphic: Fill]                         | FILL       |             | WC          |          |                     |      | 0.40     |           |           |                     |
|             |  |                        |           |   |   |            |             |             |          |                     |      | 0.50     |           |           |                     |
|             |  |                        | 0.90      | SAND (SP): pale grey; fine to medium.   | [Graphic: Sand]                         |            |             | M           |          |                     |      | 0.90     |           |           |                     |
|             |  |                        | 1         |   |   |            |             |             |          |                     |      | 1        |           |           |                     |
|             |  |                        |           |   |   |            |             |             |          |                     |      | 1.40     |           |           |                     |
|             |  |                        |           |   |   |            |             |             |          |                     |      | 1.50     |           |           |                     |
|             |  |                        |           | Borehole discontinued at 1.50m depth. Target depth reached.   |   |            |             |             |          |                     |      |          |           |           |                     |

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

**PLANT:** Hand tools/GT10

**OPERATOR:** Ground Test (TK)

**LOGGED:** S. Islam

**METHOD:** DT(300mm) to 0.25m, SFA(250mm) to 1.5m

**CASING:** Uncased

**REMARKS:** From 0.55 to 0.7m = manual excavation, DCP test not possible

Generated with CORE-GS by Geoc - Soil Log

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.6 AHD  
**COORDINATE:** E:336242.0, N:6245401.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH102  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| CONDITIONS ENCOUNTERED                                 |           |   |         |            |                             | SAMPLE   |         |      | TESTING AND REMARKS |           |           |                     |
|--|-----------|---|---------|------------|-----------------------------|----------|---------|------|---------------------|-----------|-----------|---------------------|
| GROUNDWATER<br>RL (m)                                  | DEPTH (m) | DESCRIPTION OF STRATA   | GRAPHIC | ORIGIN (#) | CONSIS. (°)<br>DENSITY. (°) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
|  |           |   |         |            |                             |          |         |      |                     |           |           |                     |
| 13/09/25 No Free Ground Water Observed Whilst Augering | 0.05      | ASPHALTIC CONCRETE; (appears AC10).   |         | NA         | ND                          | ND       |         | C    |                     | 0.05      |           |                     |
|  |           | FILL / SAND with silt with gravel: grey; fine to medium; fine to medium, angular to sub-rounded gravel; igneous aggregates (basecourse).    |         | FILL       | (WC)                        |          |         | A/ES |                     | 0.05      |           | PSP/150<br>29       |
|  |           |   |         |            |                             |          |         | B/P  |                     | 0.20      |           |                     |
|  |           |   |         |            |                             |          |         |      |                     | 0.35      |           |                     |
|  |           |   |         |            |                             |          |         |      |                     | 0.40      |           |                     |
|  | 0.35      | FILL / SAND trace silt: grey, pale grey; fine to medium; trace ceramics, plastic, metal, glass, ripped sandstone gravel, asbestos fragment. |         | FILL       | MC                          | M        |         | A/ES |                     | 0.50      |           | PSP/150             |
|  |           |   |         |            |                             |          |         | B    |                     | 0.90      |           |                     |
|  |           |   |         |            |                             |          |         | A/ES |                     | 1.00      |           |                     |
|  |           |   |         |            |                             |          |         |      |                     | 1.20      |           |                     |
|  |           |   |         |            |                             |          |         |      |                     | 1.40      |           |                     |
|  | 1.20      | SAND (SP): pale grey, orange-brown; fine to medium.   |         | AEO        | MD                          |          |         | A/ES |                     | 1.40      |           |                     |
|  |           | Borehole discontinued at 1.50m depth. Target depth reached.   |         |            |                             |          |         |      |                     | 1.50      |           |                     |

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

**PLANT:** Hand Tools/GT10

**OPERATOR:** Ground Test (TK)

**LOGGED:** S. Islam

**METHOD:** DT(300mm) to 0.05m, SFA(250mm) to 1.5m

**CASING:** Uncased

**REMARKS:** From 0.2 to 0.35m = manual excavation, DCP test not possible

Generated with CORE-GS by Geoc - Soil Log

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.7 AHD  
**COORDINATE:** E:336324.0, N:6245379.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH103  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER  |      | CONDITIONS ENCOUNTERED |  |                       |         |            | SAMPLE      |             |          | TESTING AND REMARKS |      |          |           |            |
|--|------|------------------------|--|-----------------------|---------|------------|-------------|-------------|----------|---------------------|------|----------|-----------|------------|
|  |      | RL (m)                 | DEPTH (m)  | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (°) | DENSITY (°) | MOISTURE | REMARKS             | TYPE | INTERVAL | DEPTH (m) | TEST TYPE  |
| 13/09/25 No Free Ground Water Observed Whilst Augering |      | 0.10                   | ASPHALTIC CONCRETE; (appears AC 10mm).   |                       | NA      | ND         | ND          |             |          | C                   |      | 0.10     |           |            |
|  |      | 0.20                   | FILL / Sandy GRAVEL with silt: grey; medium to coarse, angular to sub-rounded; fine to medium sand; igneous aggregates (basecourse).                         |                       | FILL    | (WC)       |             |             |          | A/ES                |      | 0.20     |           | R 30/120mm |
|  |      | 0.40                   | FILL / SAND with silt with gravel: pale grey, brown; fine to medium; medium to coarse, angular to sub-rounded gravel; occasional cobble of ripped sandstone. |                       | FILL    | MC<br>WC   |             |             |          | A/ES                |      | 0.40     |           |            |
|  |      | 0.80                   | SAND (SP): pale grey, orange-brown, dark brown; fine to medium; indurated sand band (possibly coffee rock).  |                       | AEO     | MD         |             | M           |          | A/ES                |      | 0.80     |           |            |
|  | 1.00 |                        |  |                       |         |            |             |             |          |                     |      | 1.00     |           |            |
|  | 1.40 |                        |  |                       |         |            |             |             |          |                     |      | 1.40     |           |            |
|  | 1.50 |                        |  |                       |         |            |             |             |          |                     |      | 1.50     |           |            |
|  |      |                        | Borehole discontinued at 1.50m depth. Target depth reached.  |                       |         |            |             |             |          |                     |      |          |           |            |

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

**PLANT:** Hand Tools/GT10 **OPERATOR:** Ground Test (TK) **LOGGED:** S. Islam  
**METHOD:** DT(300mm) to 0.1m, SFA(250mm) to 1.5m **CASING:** Uncased  
**REMARKS:** From 0.2 to 0.4m = manual excavation, DCP test not possible

Refer to explanatory notes for symbol and abbreviation definitions



Generated with CORE-GS by Geoc - Soil Log

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.7 AHD  
**COORDINATE:** E:336231.0, N:6245379.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH104  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER |             | CONDITIONS ENCOUNTERED   |         |            |                             |          | SAMPLE  |      |          | TESTING AND REMARKS |           |                     |
|-------------|-------------|--|---------|------------|-----------------------------|----------|---------|------|----------|---------------------|-----------|---------------------|
| RL (m)      | DEPTH (m)   | DESCRIPTION OF STRATA  | GRAPHIC | ORIGIN (#) | CONSIS. (°)<br>DENSITY. (°) | MOISTURE | REMARKS | TYPE | INTERVAL | DEPTH (m)           | TEST TYPE | RESULTS AND REMARKS |
| 26          |             | FILL / SAND with silt with gravel: orange-dark brown; fine to medium; trace sandstone, trace clay, charcoal, basalt gravel, rootlets,. |         |            |                             |          |         | A/ES | 0.10     |                     |           |                     |
|             | 0.50m-0.60m | Ripped sandstone layer   |         | FILL       |                             |          |         | B    | 0.40     |                     |           |                     |
|             | 0.50m       |  |         |            |                             |          |         | A/ES | 0.50     |                     |           |                     |
|             | 0.60m       |  |         |            |                             |          |         |      | 0.60     |                     |           |                     |
| 26          |             |  |         |            | ND                          | M        |         |      |          |                     |           |                     |
|             | 1.10        | SAND (SP) with silt: pale-grey-grey; fine to medium.   |         | AEO        |                             |          |         | A/ES | 1.10     |                     |           |                     |
|             |             |  |         |            |                             |          |         |      | 1.20     |                     |           |                     |
|             |             |  |         |            |                             |          |         | B    |          |                     |           |                     |
|             |             |  |         |            |                             |          |         |      | 1.50     |                     |           |                     |
|             |             | Borehole discontinued at 1.50m depth. Target depth reached.  |         |            |                             |          |         |      |          |                     |           |                     |
| 25          |             |  |         |            |                             |          |         |      |          |                     |           |                     |

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

**PLANT:** Hand Tools

**OPERATOR:** (P. Valenti)

**LOGGED:** P. Valenti

**METHOD:** Hand tools to 1.5m

**CASING:** Uncased

**REMARKS:** No penetrometer testing due to proximity of inground services

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.4 AHD  
**COORDINATE:** E:336228.0, N:6245355.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH105  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER |  | CONDITIONS ENCOUNTERED |           |   |         |            | SAMPLE          |             |          | TESTING AND REMARKS |      |          |           |           |
|-------------|--|------------------------|-----------|---|---------|------------|-----------------|-------------|----------|---------------------|------|----------|-----------|-----------|
|             |  | RL (m)                 | DEPTH (m) | DESCRIPTION OF STRATA   | GRAPHIC | ORIGIN (#) | CONSISTENCY (°) | DENSITY (°) | MOISTURE | REMARKS             | TYPE | INTERVAL | DEPTH (m) | TEST TYPE |
|             |  |                        |           | FILL / SAND with silt trace clay: orange-brown; fine to medium; trace sandstone, charcoal, basalt gravel, rootlets. |         | FILL       | ND              | M           |          |                     |      |          |           |           |
|             |  | 26                     |           |   |         |            |                 |             |          | A/ES                |      | 0.10     |           |           |
|             |  |                        |           |   |         |            |                 |             |          |                     |      | 0.50     |           |           |
|             |  |                        |           |   |         |            |                 |             |          |                     |      | 0.90     |           |           |
|             |  | 1                      |           |   |         |            |                 |             |          | ES                  |      | 1.00     |           |           |
|             |  |                        |           |   |         |            |                 |             |          | B                   |      |          |           |           |
|             |  |                        |           |   |         |            |                 |             |          |                     |      | 1.40     |           |           |
|             |  | 25                     |           |   |         |            |                 |             |          | ES                  |      | 1.50     |           |           |
|             |  |                        |           | Borehole discontinued at 1.50m depth. Target depth reached.   |         |            |                 |             |          |                     |      |          |           |           |

Generated with CORE-GS by Geroc - Soil Log

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

**PLANT:** Hand Tools

**OPERATOR:** (P. Valenti)

**LOGGED:** P. Valenti

**METHOD:** Hand tools to 1.5m

**CASING:** Uncased

**REMARKS:** No penetrometer testing due to proximity of inground services

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.4 AHD  
**COORDINATE:** E:336274.0, N:6245349.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH106  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER   |      | CONDITIONS ENCOUNTERED |  |                       |         |            | SAMPLE      |             |          | TESTING AND REMARKS |             |             |           |           |
|---|------|------------------------|--|-----------------------|---------|------------|-------------|-------------|----------|---------------------|-------------|-------------|-----------|-----------|
|   |      | RL (m)                 | DEPTH (m)  | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (°) | DENSITY (°) | MOISTURE | REMARKS             | TYPE        | INTERVAL    | DEPTH (m) | TEST TYPE |
| 13/09/25 No Free Ground water Observed Whilst Augering  |      |                        | FILL / Silty SAND trace clay: dark brown; fine to medium; basalt gravel, rootlets.                                     |                       | FILL    |            |             |             |          | A/ES                | 0.10 - 0.15 |             |           |           |
|   | 0.15 |                        | FILL / SAND with silt: dark grey-brown; fine to medium; with sandstone basalt, gravel, trace slag gravel and rootlets. |                       | FILL    |            |             |             |          | A/ES                | 0.15 - 0.25 |             |           |           |
|   |      |                        |  |                       |         |            |             |             |          | B                   | 0.25 - 0.45 |             |           |           |
|   | 0.45 |                        | SAND (SP) trace silt: pale grey, grey, fine to medium.   |                       |         |            |             |             |          |                     | A/ES        | 0.45 - 0.60 |           |           |
|   | 1    |                        |  |                       | AEO     |            |             | ND          | M        |                     | 0.60 - 0.70 |             |           |           |
|   |      |                        |  |                       |         |            |             |             |          | B                   | 0.70 - 1.50 |             |           |           |
|   |      |                        | Borehole discontinued at 1.80m depth. Target depth reached.  |                       |         |            |             |             |          |                     |             |             |           |           |
| <small>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.</small> |      |                        |  |                       |         |            |             |             |          |                     |             |             |           |           |

Generated with CORE-GS by Geroc - Soil Log

**PLANT:** Hand Tools  
**METHOD:** Hand tools to 1.8m  
**REMARKS:** No penetrometer testing due to proximity of inground services

**OPERATOR:** (P. Valenti)

**LOGGED:** P. Valenti  
**CASING:** Uncased

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 29.1 AHD  
**COORDINATE:** E:336331.4, N:6245351.3  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH107  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER  |      | CONDITIONS ENCOUNTERED   |           |                       |         |            | SAMPLE                      |          |         | TESTING AND REMARKS |          |           |           |
|--|------|--|-----------|-----------------------|---------|------------|-----------------------------|----------|---------|---------------------|----------|-----------|-----------|
|  |      | RL (m)   | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE                | INTERVAL | DEPTH (m) | TEST TYPE |
| 13/09/25 No free groundwater observed  | 0.10 | FILL / Silty SAND: dark brown; fine to medium; trace rootlets, igneous gravel.     |           | FILL                  |         | M          |                             |          | A/ES    | 0.05 - 0.10         | PID      | <1ppm     |           |
|  |      | FILL / Clayey SAND: grey-brown; fine to medium; with sandstone gravel and cobbles. |           | FILL                  | ND      | w=PL       |                             |          | A/ES    | 0.30 - 0.50         | PID      | <1ppm     |           |
| Borehole discontinued at 0.60m depth.<br>Refusal possibly on cobble in fill. |      |  |           |                       |         |            |                             |          |         |                     |          |           |           |
|  | 1    |  |           |                       |         |            |                             |          |         |                     |          |           |           |

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

**PLANT:** Hand tools **OPERATOR:** K. Plambeck **LOGGED:** K. Plambeck  
**METHOD:** HA to 0.6 m **CASING:** Uncased  
**REMARKS:** \*BD4/20250913 blind duplicate sample taken at 0.3 m  
 Levels and position for this location were interpolated from client provided survey mapping

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.4 AHD  
**COORDINATE:** E:336312.0, N:6245345.2  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH108  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER                           |      | CONDITIONS ENCOUNTERED   |           |                       |         |            | SAMPLE                      |          |         | TESTING AND REMARKS |          |           |           |
|---------------------------------------|------|--|-----------|-----------------------|---------|------------|-----------------------------|----------|---------|---------------------|----------|-----------|-----------|
|                                       |      | RL (m)   | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE                | INTERVAL | DEPTH (m) | TEST TYPE |
| 13/09/25 No free groundwater observed | 0.10 | FILL / Silty SAND: dark brown; fine to medium; trace rootlets and tree roots.                      |           | FILL                  |         | M          |                             |          | ES      | 0.10 - 0.20         | PID      | <1ppm     |           |
|                                       | 0.20 | FILL / Clayey SAND: dark brown; fine to medium; trace rootlets, ash, sandstone and igneous gravel. |           | FILL                  |         | M          |                             |          | ES      | 0.20 - 0.40         | PID      | <1ppm     |           |
|                                       | 0.70 | SAND (SP): pale grey; fine to medium; trace rootlets.  |           | FILL                  |         | M          |                             |          | ES      | 0.70 - 0.90         | PID      | <1ppm     |           |
|                                       | 1.00 |  |           | AEO                   |         | M          |                             |          |         |                     |          |           |           |
|                                       |      | Borehole discontinued at 1.20m depth. Target depth reached.  |           |                       |         |            |                             |          |         |                     |          |           |           |

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

**PLANT:** Hand tools

**OPERATOR:** M. Le

**LOGGED:** M. Le

**METHOD:** HA to 1.2 m

**CASING:** Uncased

**REMARKS:** Levels and position for this location were interpolated from client provided survey mapping

Refer to explanatory notes for symbol and abbreviation definitions





# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 27.8 AHD  
**COORDINATE:** E:336290.9, N:6245399.4  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH110  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| CONDITIONS ENCOUNTERED                                      |           |  |         |            | SAMPLE                      |          |         | TESTING AND REMARKS |             |           |           |                     |
|---|-----------|--|---------|------------|-----------------------------|----------|---------|---------------------|-------------|-----------|-----------|---------------------|
| GROUNDWATER<br>RL (m)                                       | DEPTH (m) | DESCRIPTION OF STRATA  | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE                | INTERVAL    | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
|   |           |  |         |            |                             |          |         |                     |             |           |           |                     |
| 13/09/25 No free groundwater observed                       | 0.20      | FILL / Clayey SAND: dark brown; fine to medium; with rootlets.                                       |         | FILL       |                             | M        |         | A/ES                | 0.05 - 0.20 | PID       | <1ppm     |                     |
|   | 0.60      | FILL / Silty SAND: dark brown; fine to medium, possibly reworked natural sand; trace igneous gravel. |         | FILL       |                             | M        |         | A/ES                | 0.30 - 0.50 | PID       | <1ppm     |                     |
|   | 0.90      | FILL / SAND: brown-grey; fine to medium.   |         | FILL       |                             | M        |         | A/ES                | 0.60 - 0.80 | PID       | <1ppm     |                     |
|   | 1.70      | SAND (SP): grey; fine to medium.   |         | AEO        |                             | ND       |         | A/ES                | 1.20 - 1.50 | PID       | <1ppm     |                     |
| Borehole discontinued at 1.70m depth. Target depth reached. |           |  |         |            |                             |          |         |                     |             |           |           |                     |

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

**PLANT:** Hand tools  
**METHOD:** HA to 1.7 m  
**REMARKS:**

**OPERATOR:** K. Plambeck

**LOGGED:** K. Plambeck  
**CASING:** Uncased

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 29.5 AHD  
**COORDINATE:** E:336347.8, N:6245369.4  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH111  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER                           |  | CONDITIONS ENCOUNTERED                                      |  |                       |         |            | SAMPLE                      |          |         | TESTING AND REMARKS |          |           |           |
|---------------------------------------|--|---|--|-----------------------|---------|------------|-----------------------------|----------|---------|---------------------|----------|-----------|-----------|
|                                       |  | RL (m)  | DEPTH (m)  | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (°) | MOISTURE | REMARKS | TYPE                | INTERVAL | DEPTH (m) | TEST TYPE |
| 13/09/25 No free groundwater observed |  |   | FILL / Silty SAND: dark brown; fine to medium; trace rootlets.   |                       | FILL    |            | M                           |          | ES      | 0.10                | PID      | <1ppm     |           |
|                                       |  | 0.10  | FILL / Clayey SAND: dark brown; fine to medium; trace rootlets, igneous gravel, ash, clinker and slag. |                       | FILL    |            | M                           |          | ES      | 0.20 - 0.30         | PID      | <1ppm     |           |
|                                       |  | 0.70  |  |                       | FILL    |            | M                           |          | ES      | 0.70 - 0.90         | PID      | <1ppm     |           |
|                                       |  | 1.10  | SAND (SP): pale grey; fine to medium.  |                       | AEO     |            | M                           |          | ES      | 1.20 - 1.40         | PID      | <1ppm     |           |
|                                       |  | Borehole discontinued at 1.60m depth. Target depth reached. |  |                       |         |            |                             |          |         |                     |          |           |           |

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

**PLANT:** Hand tools

**OPERATOR:** M. Le

**LOGGED:** M. Le

**METHOD:** HA to 1.6 m

**CASING:** Uncased

**REMARKS:** \*BD1/250913 taken at 0.7 to 0.9 m

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 29.4 AHD  
**COORDINATE:** E:336356.6, N:6245385.5  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH112  
**PROJECT No:** 227492.06  
**DATE:** 13/09/25  
**SHEET:** 1 of 1

| GROUNDWATER                           |  | CONDITIONS ENCOUNTERED                                      |  |                       |         |            | SAMPLE                      |          |         | TESTING AND REMARKS |          |           |           |
|---------------------------------------|--|---|--|-----------------------|---------|------------|-----------------------------|----------|---------|---------------------|----------|-----------|-----------|
|                                       |  | RL (m)  | DEPTH (m)  | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE                | INTERVAL | DEPTH (m) | TEST TYPE |
| 13/09/25 No free groundwater observed |  |   | FILL / Silty SAND: dark brown; fine to medium; with rootlets.                        |                       | FILL    |            | M                           |          | A/ES    |                     | 0.20     | PID       | <1ppm     |
|                                       |  | 0.20  | FILL / SAND: dark brown; fine to medium; trace igneous gravel.                       |                       | FILL    |            | M                           |          | A/ES    |                     | 0.30     | PID       | <1ppm     |
|                                       |  | 0.60  | SAND (SP): grey; fine to medium.   |                       | AEO     | ND         | M                           |          | A/ES    |                     | 0.80     | PID       | <1ppm     |
|                                       |  | 1.30  | SAND (SP): orange-brown; fine to medium; indurated sand band (possibly coffee rock). |                       | AEO     |            | M                           |          | A/ES    |                     | 1.40     | PID       | <1ppm     |
|                                       |  | Borehole discontinued at 1.60m depth. Target depth reached. |  |                       |         |            |                             |          |         |                     |          |           |           |

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

**PLANT:** Hand tools **OPERATOR:** K. Plambeck **LOGGED:** K. Plambeck  
**METHOD:** HA to 1.6 m **CASING:** Uncased  
**REMARKS:** \*BD2/20250913 blind duplicate sample taken at 0.3 m  
 Levels for this location were interpolated from client provided survey mapping

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.8 AHD  
**COORDINATE:** E:336255.7, N:6245382.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH1  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 05/05/25  
**SHEET:** 1 of 4

| CONDITIONS ENCOUNTERED |           |  |         | SAMPLE     |             |                 | TESTING AND REMARKS |         |      |          |           |           |                     |          |           |
|------------------------|-----------|--|---------|------------|-------------|-----------------|---------------------|---------|------|----------|-----------|-----------|---------------------|----------|-----------|
| GROUNDWATER            | DEPTH (m) | DESCRIPTION OF STRATA  | GRAPHIC | ORIGIN (#) | CONSIS. (°) | DENSITY (g/cm³) | MOISTURE            | REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE |
| RL (m)                 | 0.35      | FILL / Silty SAND trace gravel: dark brown; fine to medium; sandstone gravel; rootlets to 0.1m.              |         | FILL       | (VC)        |                 |                     |         | A/ES | 0.10     |           |           |                     |          |           |
|                        | 0.80      | FILL / Silty SAND with gravel: orange brown; fine to medium; sandstone gravel; occasional sandstone cobbles. |         | FILL       |             |                 |                     |         | B    | 0.40     |           |           |                     |          |           |
|                        | 1.00      | SAND (SP): pale grey; fine to medium; with dark grey decomposed wood/charcoal bands.                         |         |            |             |                 |                     |         | A/ES | 0.50     |           |           |                     |          |           |
|                        | 1.40      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 1.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 2.50      |  |         |            |             |                 | M                   |         |      |          |           |           |                     |          |           |
|                        | 2.95      |  |         |            |             |                 |                     |         | SPT  |          |           | SPT       | 1,2,3 N=5           |          |           |
|                        | 4.00      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 4.45      |  |         |            |             |                 |                     |         | SPT  |          |           | SPT       | 9,9,7 N=16          |          |           |
|                        | 5.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 5.95      |  |         |            |             |                 |                     |         | SPT  |          |           | SPT       | 3,3,4 N=7           |          |           |
|                        | 7.00      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 7.45      |  |         |            |             |                 |                     |         | SPT  |          |           | SPT       | 13,19,18 N=37       |          |           |
|                        | 8.50      | SAND (SP): pale grey; fine to medium.  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         | SPT  |          |           | SPT       | 20,27,25/110        |          |           |
|                        | 9.00      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.50      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |
|                        | 8.91      |  |         |            |             |                 |                     |         |      |          |           |           |                     |          |           |

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.8 AHD  
**COORDINATE:** E:336255.7, N:6245382.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH1  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 05/05/25  
**SHEET:** 2 of 4

| CONDITIONS ENCOUNTERED |           |  |         |            |                             | SAMPLE   |         |      | TESTING AND REMARKS |           |           |                     |          |           |
|------------------------|-----------|--|---------|------------|-----------------------------|----------|---------|------|---------------------|-----------|-----------|---------------------|----------|-----------|
| GROUNDWATER<br>RL (m)  | DEPTH (m) | DESCRIPTION OF STRATA                        | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE |
|                        |           |  |         |            |                             |          |         |      |                     |           |           |                     |          |           |
|                        |           | [CONT] SAND (SP): pale grey; fine to medium. |         |            |                             |          |         |      |                     |           |           |                     |          |           |
|                        | 10.00     |  |         |            |                             |          |         | SPT  |                     | 10.00     | SPT       | 19,27,30 N=57       |          |           |
|                        | 10.45     |  |         |            |                             |          |         |      |                     | 10.45     |           |                     |          |           |
|                        | 11.00     |  |         |            |                             |          |         |      |                     | 11.00     |           |                     |          |           |
|                        | 11.50     |  |         |            |                             |          |         | SPT  |                     | 11.50     | SPT       | 18,30,25/80         |          |           |
|                        | 11.88     |  |         | AEO        | VD                          | W        |         |      |                     | 11.88     |           |                     |          |           |
|                        | 12.00     |  |         |            |                             |          |         |      |                     | 12.00     |           |                     |          |           |
|                        | 13.00     |  |         |            |                             |          |         | SPT  |                     | 13.00     | SPT       | 25,25/70 (HB)       |          |           |
|                        | 13.22     |  |         |            |                             |          |         |      |                     | 13.22     |           |                     |          |           |
|                        | 13.65     | Continued as rock log                        |         |            |                             |          |         |      |                     | 13.65     |           |                     |          |           |
|                        | 14.00     |  |         |            |                             |          |         |      |                     | 14.00     |           |                     |          |           |
|                        | 15.00     |  |         |            |                             |          |         |      |                     | 15.00     |           |                     |          |           |
|                        | 16.00     |  |         |            |                             |          |         |      |                     | 16.00     |           |                     |          |           |
|                        | 17.00     |  |         |            |                             |          |         |      |                     | 17.00     |           |                     |          |           |
|                        | 18.00     |  |         |            |                             |          |         |      |                     | 18.00     |           |                     |          |           |
|                        | 19.00     |  |         |            |                             |          |         |      |                     | 19.00     |           |                     |          |           |

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

**PLANT:** Geo 305 **OPERATOR:** Ground Test (LC) **LOGGED:** PAV/IH  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 14.5m, NMLC to 20.40m **CASING:** HWT to 5.6m, then HQ to 14.5m  
**REMARKS:** \*BD1/20250502 blind duplicate sample taken at 0.4 m



Refer to explanatory notes for symbol and abbreviation definitions

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.8 AHD  
**COORDINATE:** E:336255.7, N:6245382.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH1  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 05/05/25  
**SHEET:** 3 of 4

| CONDITIONS ENCOUNTERED |           |  |         |        |           |          |              |     |                      | SAMPLE   |                |      | TESTING  |           |           |                     |          |           |
|------------------------|-----------|--|---------|--------|-----------|----------|--------------|-----|----------------------|--|----------------|------|----------|-----------|-----------|---------------------|----------|-----------|
| GROUNDWATER            | DEPTH (m) | DESCRIPTION OF STRATA  | GRAPHIC | WEATH. | DEPTH (m) | STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS  | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE |
| RL (m)                 | 16        |  |         |        |           |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 11        |  |         |        |           |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 12        |  |         |        |           |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 13        |  |         |        |           |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 14        |  |         |        |           |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 14.5      | Continued from soil log<br>SANDSTONE: pale brown and red, fine to medium grained; iron-cemented bands. Hawkesbury Sandstone. |         |        | 13.65     | (ML)     |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 15        |  |         |        | 14.50     |          |              |     |                      | 14.50m: IS, Clay 50mm  |                |      |          |           |           |                     |          |           |
|                        | 15.45     | SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.  |         |        | 14.96     |          |              |     |                      | 14.72-14.79m: B x2, PR, CN, RF<br>14.79m: JT, 70°, CU, SN Fe, RF<br>15.00m: JT, 90°, PR, SN Fe, RF<br>15.12m: IS, Clay 30mm<br>15.36m: B, PR, INF Clay |                |      |          | 15        | PLT       | PL(A)=0.89MPa       |          |           |
|                        | 16        |  |         |        | 15.12     |          |              | 100 | 87                   |  |                |      |          |           |           |                     |          |           |
|                        | 17        |  |         |        | 16.16     |          |              |     |                      | 16.16m: B, PR, INF Clay  |                |      |          |           |           |                     |          |           |
|                        | 18        |  |         |        | 16.57     |          |              |     |                      | 16.57m: JT, 40°, PR, INF Clay, SM  |                |      |          |           |           |                     |          |           |
|                        | 19        |  |         |        | 17.20     |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 19.39     | SANDSTONE: pale grey, fine to medium grained. Hawkesbury Sandstone.  |         |        | 18.20     |          |              |     |                      | 18.20m: JT, 20°, PR, CN, SM<br>18.42m: B, 0°, PR, CN<br>18.52m: JT, 5°, PR, VNR Clay, RF<br>18.86m: IS, Clay 5mm                                       |                |      |          | 18        | PLT       | PL(A)=1.4MPa        |          |           |
|                        | 19.50     |  |         |        | 18.86     |          |              |     |                      |  |                |      |          |           |           |                     |          |           |
|                        | 20        |  |         |        | 19.39     |          |              |     |                      | 19.39m: B, 20°, CN<br>19.46m: B, 5°, VNR Clay  |                |      |          |           |           |                     |          |           |
|                        |           |  |         |        | 19.50     |          |              |     |                      |  |                |      |          |           |           |                     |          |           |

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

**PLANT:** Geo 305 **OPERATOR:** Ground Test (LC) **LOGGED:** PAV/IH  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 14.5m, NMLC to 20.40m **CASING:** HWT to 5.6m, then HQ to 14.5m  
**REMARKS:** \*BD1/20250502 blind duplicate sample taken at 0.4 m



Refer to explanatory notes for symbol and abbreviation definitions

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.8 AHD  
**COORDINATE:** E:336255.7, N:6245382.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH1  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 05/05/25  
**SHEET:** 4 of 4

| GROUNDWATER |    | CONDITIONS ENCOUNTERED |  |                       |                                   |               |         |        |           |          |              |     | SAMPLE               |                   |                | TESTING |          |           |              |                     |          |
|-------------|----|------------------------|--|-----------------------|-----------------------------------|---------------|---------|--------|-----------|----------|--------------|-----|----------------------|-------------------|----------------|---------|----------|-----------|--------------|---------------------|----------|
|             |    | 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 | SAMPLE REMARKS | TYPE    | INTERVAL | DEPTH (m) | TEST TYPE    | RESULTS AND REMARKS | BACKFILL |
|             | 6  |                        | [CONT] SANDSTONE: pale grey, fine to medium grained. Hawkesbury Sandstone. |                       |                                   |               | FR      |        |           | 100      | 96           |     |                      |                   |                |         |          | PLT       | PL(A)=1.2MPa | Gravel              | 100.000  |
|             | 21 |                        | Borehole discontinued at 20.40m depth. Target Depth Reached.               |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 5  |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 22 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 4  |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 23 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 3  |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 24 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 2  |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 25 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 1  |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 26 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | -0 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 27 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | -1 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 28 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | -2 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | 29 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |
|             | -3 |                        |  |                       |                                   |               |         |        |           |          |              |     |                      |                   |                |         |          |           |              |                     |          |

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

**PLANT:** Geo 305 **OPERATOR:** Ground Test (LC) **LOGGED:** PAV/IH  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 14.5m, NMLC to 20.40m **CASING:** HWT to 5.6m, then HQ to 14.5m  
**REMARKS:** \*BD1/20250502 blind duplicate sample taken at 0.4 m

Refer to explanatory notes for symbol and abbreviation definitions



# CORE PHOTO LOG

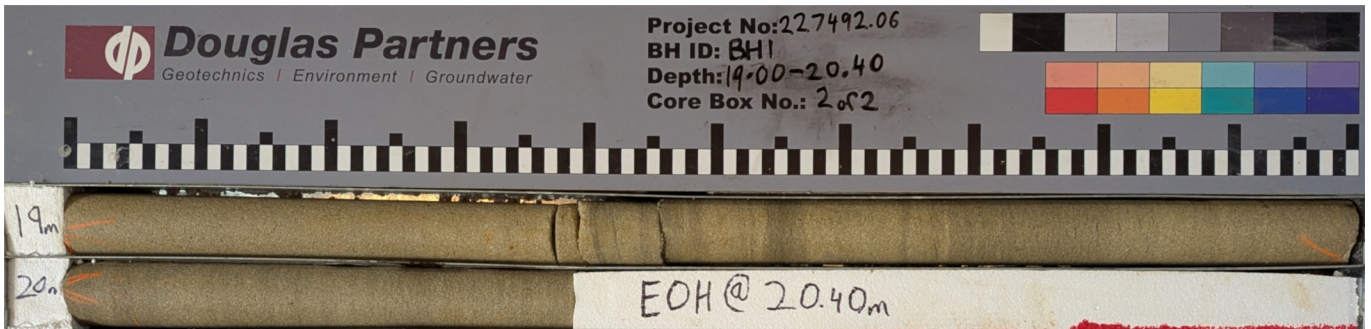
**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.8 AHD  
**COORDINATE:** E:336255.7, N:6245382.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH1  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 05/05/25  
**SHEET:** 1 of 1



14.50-19.00 m depth



19.00-20.40 m depth



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.6 AHD  
**COORDINATE:** E:336323.7, N:6245371.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH2  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 06/05/25  
**SHEET:** 2 of 4

| CONDITIONS ENCOUNTERED |           |   |         |            |                            | SAMPLE   |         |      | TESTING AND REMARKS |           |           |                     |          |           |
|------------------------|-----------|---|---------|------------|----------------------------|----------|---------|------|---------------------|-----------|-----------|---------------------|----------|-----------|
| GROUNDWATER<br>RL (m)  | DEPTH (m) | DESCRIPTION OF STRATA                               | GRAPHIC | ORIGIN (#) | CONSIS. (%)<br>DENSITY (%) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE |
|                        |           |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 10.00     | [CONT] SAND (SP): white, pale grey; fine to medium. |         | AEO        | VD                         | W        |         | SPT  | 10.00 - 10.45       | 10.00     | SPT       | 16,24,25 N=49       |          |           |
|                        | 11.50     | Continued as rock log                               |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 12.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 13.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 14.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 15.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 16.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 17.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 18.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |
|                        | 19.00     |   |         |            |                            |          |         |      |                     |           |           |                     |          |           |

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

**PLANT:** Geo 305  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 11.6m, NMLC to 20.27m  
**REMARKS:**

**OPERATOR:** Ground Test (LC)

**LOGGED:** PAV/IH  
**CASING:** HWT to 5.6m, then HQ to 11.5m

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.6 AHD  
**COORDINATE:** E:336323.7, N:6245371.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH2  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 06/05/25  
**SHEET:** 3 of 4

| CONDITIONS ENCOUNTERED |           |  |  |         |        |                |          |              |     | SAMPLE               |  |                | TESTING |          |           |           |                             |           |           |
|------------------------|-----------|--|--|---------|--------|----------------|----------|--------------|-----|----------------------|--|----------------|---------|----------|-----------|-----------|-----------------------------|-----------|-----------|
| GROUNDWATER            | DEPTH (m) | DESCRIPTION OF STRATA  | SOIL STRENGTH (where encountered)<br>SOIL MOISTURE | GRAPHIC | WEATH. | DEPTH (m)      | STRENGTH | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS  | SAMPLE REMARKS | TYPE    | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS         | BACKFILL  | WELL PIPE |
| RL (m)                 |           |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 18        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 11        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 11.87     | Continued from soil log<br>SANDSTONE: pale brown, medium to coarse grained; iron-cemented bands. Hawkesbury Sandstone. |  |         |        | 11.50<br>11.60 |          |              |     |                      | 11.71-11.74m: B x2, 0°, PR, CN, SM   |                |         | SPT      | 11.55     | PLT       | 25/50 (HB)<br>PL(A)=0.38MPa | Gravel    |           |
|                        | 12        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 12.58     |  |  |         |        | 12.58          |          |              |     |                      | 12.58m JT, 20°, PR, CN, SM   |                |         |          |           | PLT       | PL(A)=0.38MPa               | Bentonite |           |
|                        | 12.83     | SANDSTONE: red orange / pale grey, fine to medium grained; iron-cemented bands. Hawkesbury Sandstone.                  |  |         |        | 12.83          |          | 74           | 62  |                      | 12.77m: JT, 45°, PR, VNR Clay, SM<br>12.89m: B, 0°, INF Clay, SM               |                |         |          |           | PLT       | PL(A)=0.24MPa               |           |           |
|                        | 13        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 13.43     |  |  |         |        | 13.43          |          |              |     |                      | 13.41m: IS, Clay 20mm  |                |         |          |           |           |                             |           |           |
|                        | 13.62     |  |  |         |        | 13.62          |          |              |     |                      | 13.62m: IS, Clay 40mm  |                |         |          |           |           |                             |           |           |
|                        | 14        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 14.08     | SANDSTONE: pale grey, fine to medium grained. Hawkesbury Sandstone.  |  |         |        | 14.08          |          |              |     |                      |  |                |         |          |           | PLT       | PL(A)=1.2MPa                |           |           |
|                        | 14        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 15        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           | PLT       | PL(A)=1.1MPa                |           |           |
|                        | 15        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 16        |  |  |         |        |                |          | 100          | 93  |                      |  |                |         |          |           |           |                             |           |           |
|                        | 16        |  |  |         |        |                |          |              |     |                      | 16.19m: JT, IR, SN Fe, SM<br>16.34m: IS, Clay 5mm<br>16.42m: B, 0°, PR, CN, SM |                |         |          |           | PLT       | PL(A)=1.2MPa                | Gravel    |           |
|                        | 17        |  |  |         |        |                |          |              |     |                      | 16.85m JT, 10-30°, IR, CN, VR  |                |         |          |           | PLT       | PL(A)=1.4MPa                |           |           |
|                        | 17        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 18        |  |  |         |        |                |          |              |     |                      | 17.69m: B, 0°, PR, INF Clay  |                |         |          |           | PLT       | PL(A)=1.2MPa                |           |           |
|                        | 18        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 19        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           | PLT       | PL(A)=1.1MPa                |           |           |
|                        | 19        |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |
|                        | 9         |  |  |         |        |                |          |              |     |                      |  |                |         |          |           |           |                             |           |           |

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

**PLANT:** Geo 305  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 11.6m, NMLC to 20.27m  
**REMARKS:**

**OPERATOR:** Ground Test (LC)

**LOGGED:** PAV/IH  
**CASING:** HWT to 5.6m, then HQ to 11.5m



Refer to explanatory notes for symbol and abbreviation definitions

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

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.6 AHD  
**COORDINATE:** E:336323.7, N:6245371.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH2  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 06/05/25  
**SHEET:** 4 of 4

| 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                 | SAMPLE         |      |          | TESTING   |           |                     |              |           |       |
|-------------|--------|-----------|--|-----------------------------------|---------------|---------|--------|-----------|----------|--------------|-----|----------------------|-----------------------------------|----------------|------|----------|-----------|-----------|---------------------|--------------|-----------|-------|
|             |        |           |  |                                   |               |         |        |           |          |              |     |                      |                                   | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL     | WELL PIPE |       |
|             |        | 8         | [CONT] SANDSTONE: pale grey, fine to medium grained. Hawkesbury Sandstone. |                                   |               |         | FR     |           |          | 100          | 100 |                      | 20.03m: JT, 15°, PR, INF Clay, SM |                |      |          |           |           | PLT                 | PL(A)=1.3MPa | Gravel    | 600/3 |
|             |        | 21        | Borehole discontinued at 20.27m depth. Target Depth Reached.               |                                   |               |         |        |           |          |              |     |                      |                                   |                |      |          |           |           |                     |              |           |       |

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

**PLANT:** Geo 305 **OPERATOR:** Ground Test (LC) **LOGGED:** PAV/IH  
**METHOD:** HA/VE to 1.9m, AD/T to 5.5m, WB to 11.6m, NMLC to 20.27m **CASING:** HWT to 5.6m, then HQ to 11.5m  
**REMARKS:**



Refer to explanatory notes for symbol and abbreviation definitions

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

# CORE PHOTO LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.6 AHD  
**COORDINATE:** E:336323.7, N:6245371.0  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH2  
**PROJECT No:** 227492.06  
**DATE:** 02/05/25 - 06/05/25  
**SHEET:** 1 of 1



11.60-16.00 m depth



16.00-20.27 m depth

# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.6 AHD  
**COORDINATE:** E:336242.2, N:6245362.7  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH3  
**PROJECT No:** 227492.06  
**DATE:** 05/05/25  
**SHEET:** 1 of 1

| GROUNDWATER    |    | CONDITIONS ENCOUNTERED  |  |                       |         |           |                             | SAMPLE   |         |      | TESTING AND REMARKS |           |           |                     |
|----------------|----|---|--|-----------------------|---------|-----------|-----------------------------|----------|---------|------|---------------------|-----------|-----------|---------------------|
|                |    | RL (m)  | DEPTH (m)  | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| 05/05/25 NFGWO | 26 | 0.10  | FILL / GRAVEL gravel: brown; igneous gravel, trace rootlets and tree branches.       |                       | FILL    |           |                             |          |         | ES   | 0.10                | PID       | <1ppm     |                     |
|                |    | 0.10  | FILL / Silty SAND: dark brown; coarse; trace igneous rounded gravel and rootlets.    |                       | FILL    |           |                             |          |         |      | ES                  | 0.10      | PID       | <1ppm               |
|                |    | 0.20  |  |                       | FILL    |           |                             |          |         |      | B                   | 0.20      |           |                     |
|                |    | 0.30  |  |                       | FILL    |           | ND                          | M        |         |      |                     | 0.30      |           |                     |
|                |    | 0.40  | FILL / SAND: pale brown; coarse; trace igneous rounded gravel and sandstone cobbles. |                       | FILL    |           |                             |          |         | * ES | 0.40                | PID       | <1ppm     |                     |
|                |    | 0.50  |  |                       | FILL    |           |                             |          |         |      | 0.50                |           |           |                     |
|                |    | Borehole discontinued at 0.60m depth. Refusal on obstruction in fill. |  |                       |         |           |                             |          |         |      |                     |           |           |                     |
|                |    | 1   |  |                       |         |           |                             |          |         |      |                     |           |           |                     |
|                |    | 25  |  |                       |         |           |                             |          |         |      |                     |           |           |                     |

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

**PLANT:** Hand tools  
**METHOD:** HA to 0.6 m  
**REMARKS:** \*BD1/20250505 taken at 0.4 to 0.5 m

**OPERATOR:** ML

**LOGGED:** ML  
**CASING:** Uncased

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 26.2 AHD  
**COORDINATE:** E:336256.3, N:6245345.6  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH4  
**PROJECT No:** 227492.06  
**DATE:** 05/05/25  
**SHEET:** 1 of 1

| GROUNDWATER    |    | CONDITIONS ENCOUNTERED |   |                       |         |           |                             | SAMPLE   |         |      | TESTING AND REMARKS |             |           |
|----------------|----|------------------------|---|-----------------------|---------|-----------|-----------------------------|----------|---------|------|---------------------|-------------|-----------|
|                |    | RL (m)                 | DEPTH (m)   | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m)   | TEST TYPE |
| 05/05/25 NFGWO | 26 | 0.10                   | FILL / Silty SAND: dark grey; fine; trace sandstone gravel, igneous gravel and ash; rootlets to 0.1m. |                       | FILL    |           |                             |          |         | ES   | 0.10                | PID         | <1ppm     |
|                |    |                        | FILL / Silty SAND: dark grey; fine; trace sandstone gravel, igneous gravel and ash .                  |                       | FILL    |           | ND                          | M        |         |      | ES                  | 0.50 - 0.60 | PID       |
|                |    |                        |   |                       |         |           |                             |          |         | ES   | 0.80 - 0.90         | PID         | <1ppm     |
|                |    |                        | Borehole discontinued at 0.90m depth. Refusal on obstruction in fill.                                 |                       |         |           |                             |          |         |      |                     |             |           |
|                | 25 | 1                      |   |                       |         |           |                             |          |         |      |                     |             |           |

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

**PLANT:** Hand tools  
**METHOD:** HA to 0.9 m  
**REMARKS:**

**OPERATOR:** ML

**LOGGED:** ML  
**CASING:** Uncased

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 28.6 AHD  
**COORDINATE:** E:336309.3, N:6245353.1  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH5  
**PROJECT No:** 227492.06  
**DATE:** 05/05/25  
**SHEET:** 1 of 1

| GROUNDWATER    |  | CONDITIONS ENCOUNTERED  |           |                       |         |           |                             | SAMPLE   |         |      | TESTING AND REMARKS |           |           |                     |
|----------------|--|---|-----------|-----------------------|---------|-----------|-----------------------------|----------|---------|------|---------------------|-----------|-----------|---------------------|
|                |  | RL (m)  | DEPTH (m) | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS. (%)<br>DENSITY. (%) | MOISTURE | REMARKS | TYPE | INTERVAL            | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS |
| 05/05/25 NFGWO | 0.10   | FILL / Silty SAND: dark brown; fine; trace igneous gravel, rootlets, tree branches, ash and slag; rootlets to 0.1m. |           | FILL                  | FILL    |           |                             |          |         |      | 0.10                | ES        | PID       | <1ppm               |
|                | 0.20   | FILL / Silty SAND: dark brown; fine; trace igneous gravel, tree branches, ash and slag.                             |           | FILL                  | FILL    |           |                             |          |         | 0.20 |                     |           |           |                     |
|                | 28   | From 0.60m: pale brown  | FILL      | FILL                  | ND      | M         |                             |          |         |      | 0.50                | 0.60      | ES        | PID                 |
| 1              | Borehole discontinued at 1.00m depth.<br>Refusal on obstruction in fill. |   |           |                       |         |           |                             |          |         |      |                     |           |           |                     |
| 27             |  |   |           |                       |         |           |                             |          |         |      |                     |           |           |                     |

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

**PLANT:** Hand tools  
**METHOD:** HA to 1.0 m  
**REMARKS:**

**OPERATOR:** ML

**LOGGED:** ML  
**CASING:** Uncased

Refer to explanatory notes for symbol and abbreviation definitions



# BOREHOLE LOG

**CLIENT:** The University of New South Wales  
**PROJECT:** UNSW N13 Barker Street Development  
**LOCATION:** Barker Street, Kensington, NSW

**SURFACE LEVEL:** 29.7 AHD  
**COORDINATE:** E:336359.2, N:6245332.6  
**DATUM/GRID:** MGA2020 Zone 56  
**DIP/AZIMUTH:** 90°/---°

**LOCATION ID:** BH6  
**PROJECT No:** 227492.06  
**DATE:** 05/05/25  
**SHEET:** 1 of 1

| GROUNDWATER    |    | CONDITIONS ENCOUNTERED |   |                       |         |           | SAMPLE      |              |          | TESTING AND REMARKS |      |          |           |           |
|----------------|----|------------------------|---|-----------------------|---------|-----------|-------------|--------------|----------|---------------------|------|----------|-----------|-----------|
|                |    | RL (m)                 | DEPTH (m)   | DESCRIPTION OF STRATA | GRAPHIC | ORIGIN(#) | CONSIS. (°) | DENSITY. (°) | MOISTURE | REMARKS             | TYPE | INTERVAL | DEPTH (m) | TEST TYPE |
| 05/05/25 NFGWO | 29 | 0.10                   | FILL / Clayey SAND: dark brown; fine; trace ash and slag; rootlets to 0.1m. | █                     | FILL    |           |             |              |          |                     |      | 0.10     | ES        | PID <1ppm |
|                | 29 | 0.20                   | FILL / Clayey SAND: dark brown; fine; trace ash and slag.                   | █                     | FILL    | ND        | M           |              |          |                     |      | 0.20     | ES        | PID <1ppm |
|                | 28 | 1                      | Borehole discontinued at 0.70m depth.<br>Refusal on inferred tree roots.    |                       |         |           |             |              |          |                     |      |          |           |           |

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

**PLANT:** Hand tools  
**METHOD:** HA to 0.7 m  
**REMARKS:**

**OPERATOR:** ML

**LOGGED:** ML  
**CASING:** Uncased

Refer to explanatory notes for symbol and abbreviation definitions

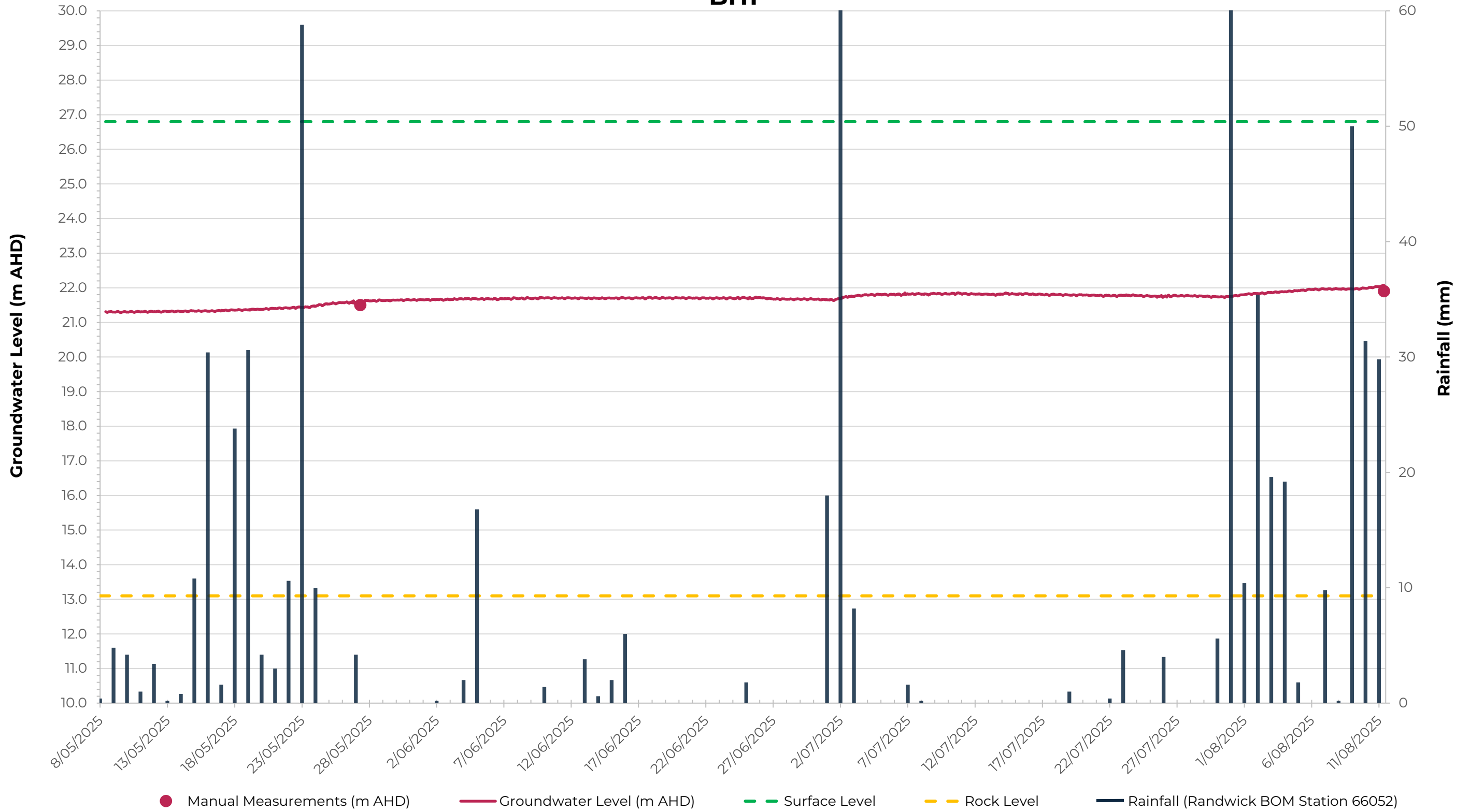


---

## **Appendix D**

Groundwater Level Monitoring and Hydraulic  
Conductivity Tests

# BH1



CLIENT: The University of New South Wales

OFFICE: Sydney

SURFACE LEVEL: 26.8 m AHD

DRAWN BY: L. Sigdel

DATE: 11 August 2025

**Groundwater Monitoring 08/05/2025 to 11/08/2025**

**N13 Barker Street Development**

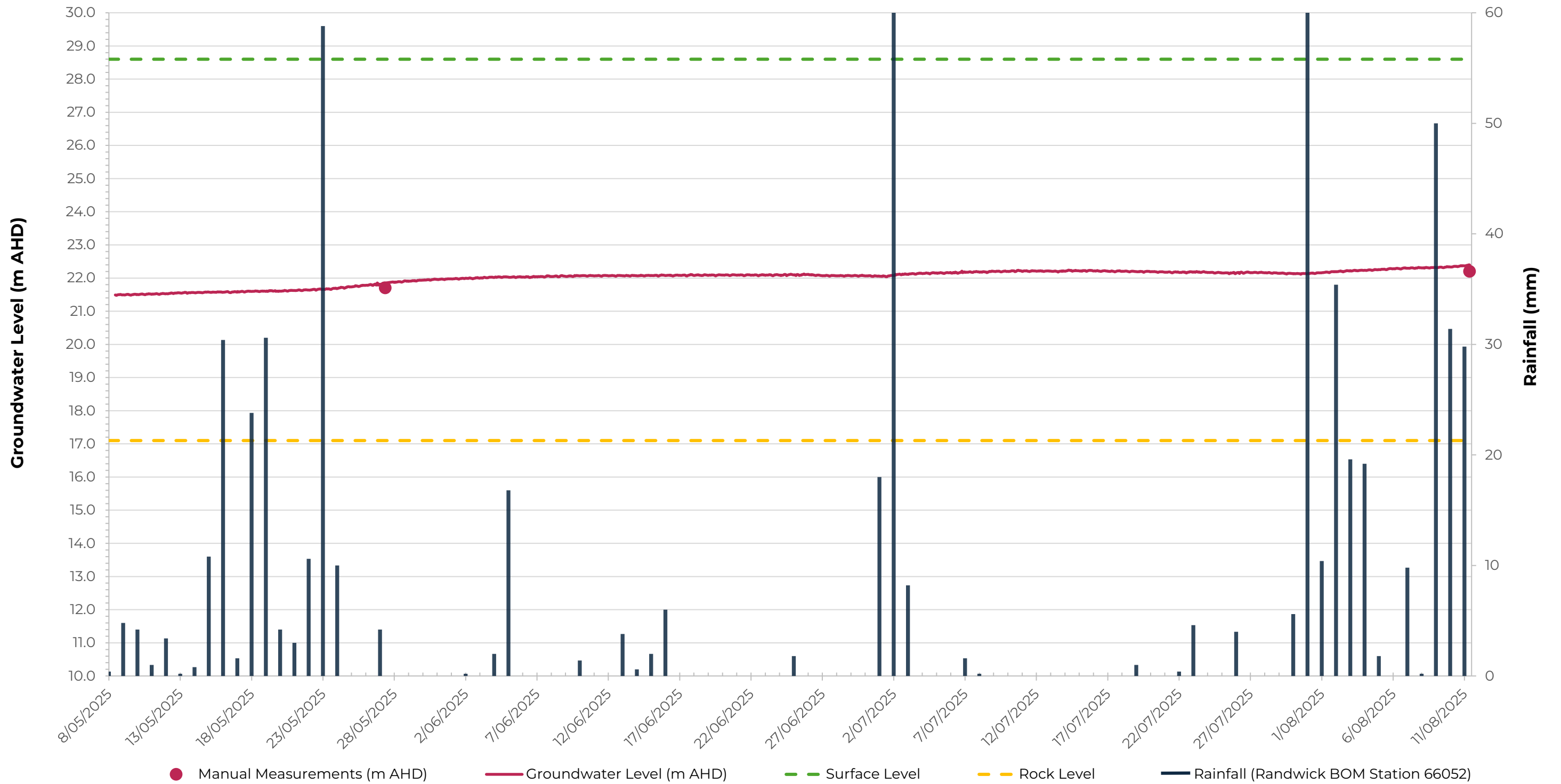
**Barker Street, Kensington NSW**

PROJECT NO: 227492.06

FIGURE NO: 1 of 4

REVISION: Rev0

# BH2

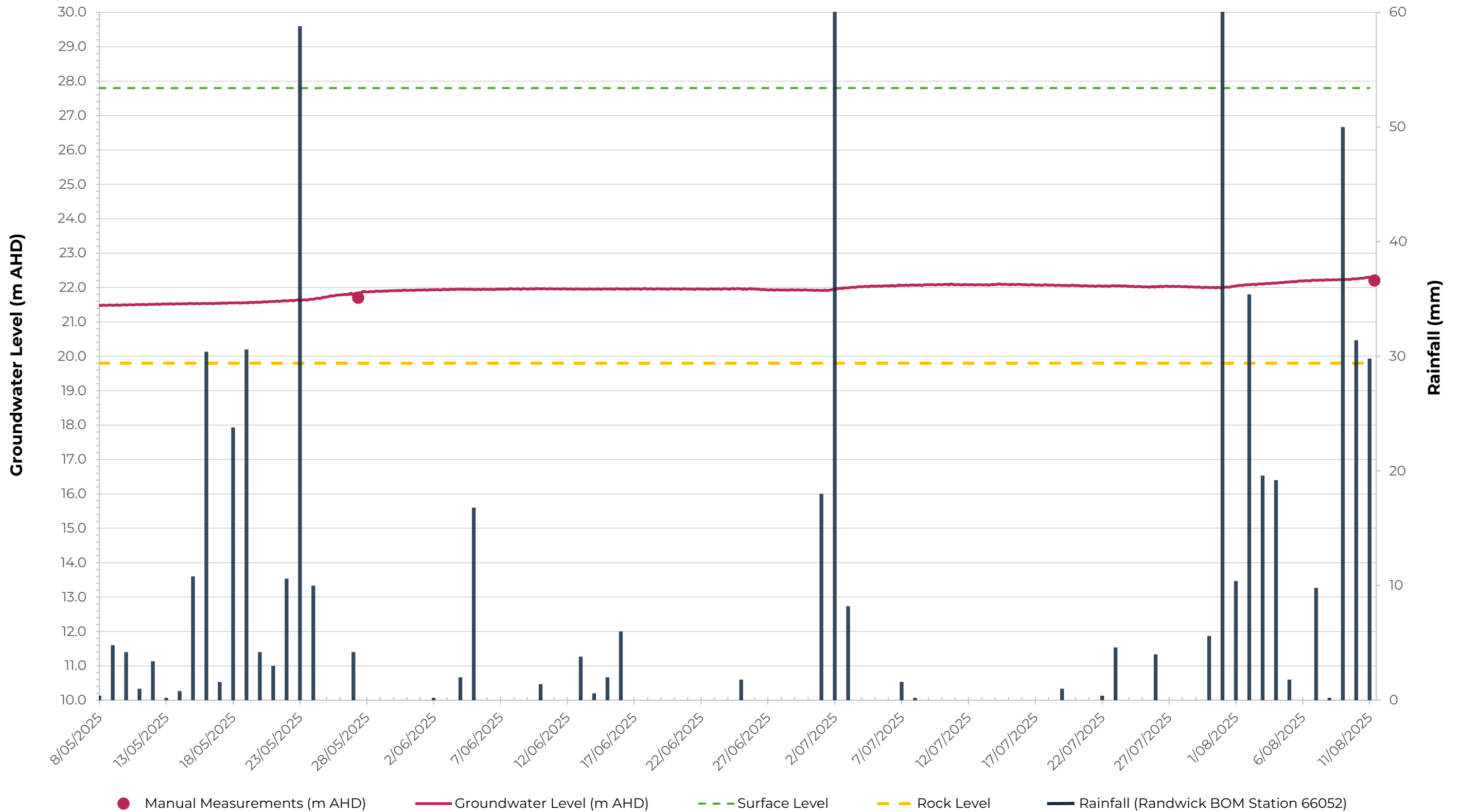


CLIENT: The University of New South Wales  
 OFFICE: Sydney  
 SURFACE LEVEL: 28.6 m AHD  
 DRAWN BY: L. Sigdel  
 DATE: 11 August 2025

**Groundwater Monitoring 08/05/2025 to 11/08/2025**  
**N13 Barker Street Development**  
**Barker Street, Kensington NSW**

PROJECT NO: 227492.06  
 FIGURE NO: 2 of 4  
 REVISION: Rev0

# EH05

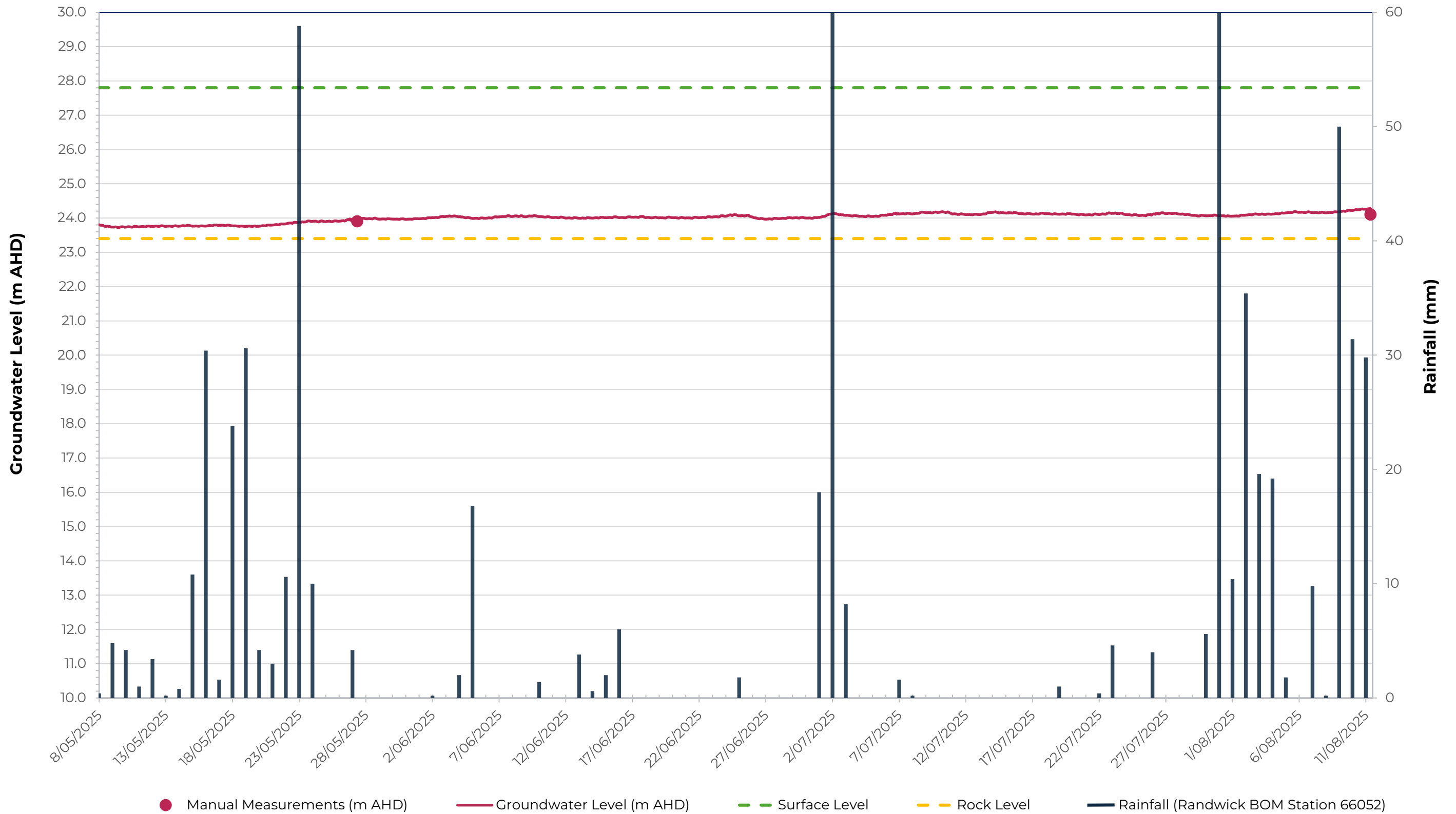


CLIENT: The University of New South Wales  
 OFFICE: Sydney      DRAWN BY: L. Sigdel  
 SURFACE LEVEL: 27.8 m AHD      DATE: 11 August 2025

**Groundwater Monitoring 08/05/2025 to 11/08/2025**  
**N13 Barker Street Development**  
**Barker Street, Kensington NSW**

PROJECT NO: 227492.06  
 FIGURE NO: 3 of 4  
 REVISION: Rev1

# EH08

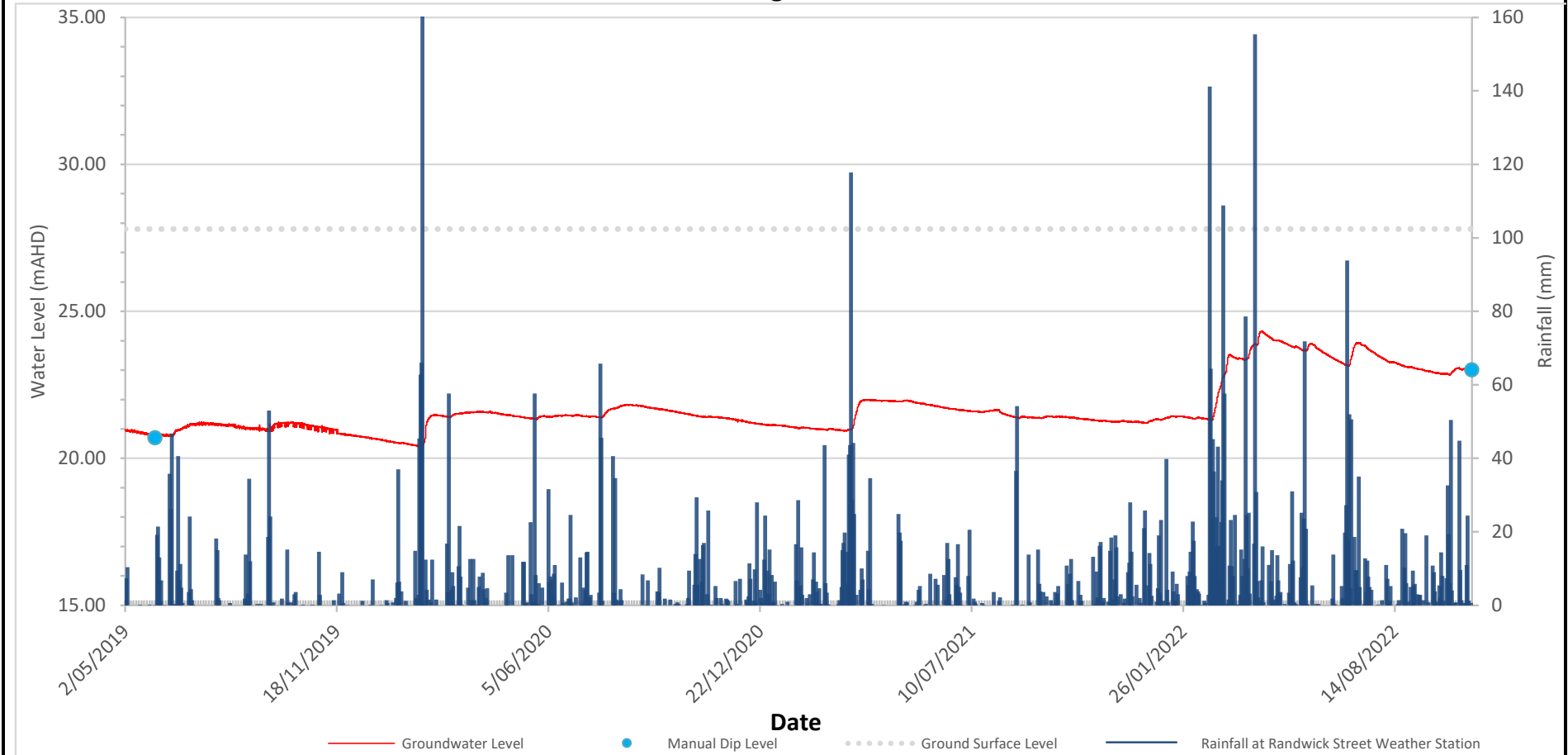


CLIENT: The University of New South Wales  
 OFFICE: Sydney      DRAWN BY: L. Sigdel  
 SURFACE LEVEL: 29.8 m AHD      DATE: 11 August 2025

**Groundwater Monitoring 08/05/2025 to 11/08/2025**  
**N13 Barker Street Development**  
**Barker Street, Kensington NSW**

PROJECT NO: 227492.06  
 FIGURE NO: 4 of 4  
 REVISION: Rev0

### Monitoring Well: EH05



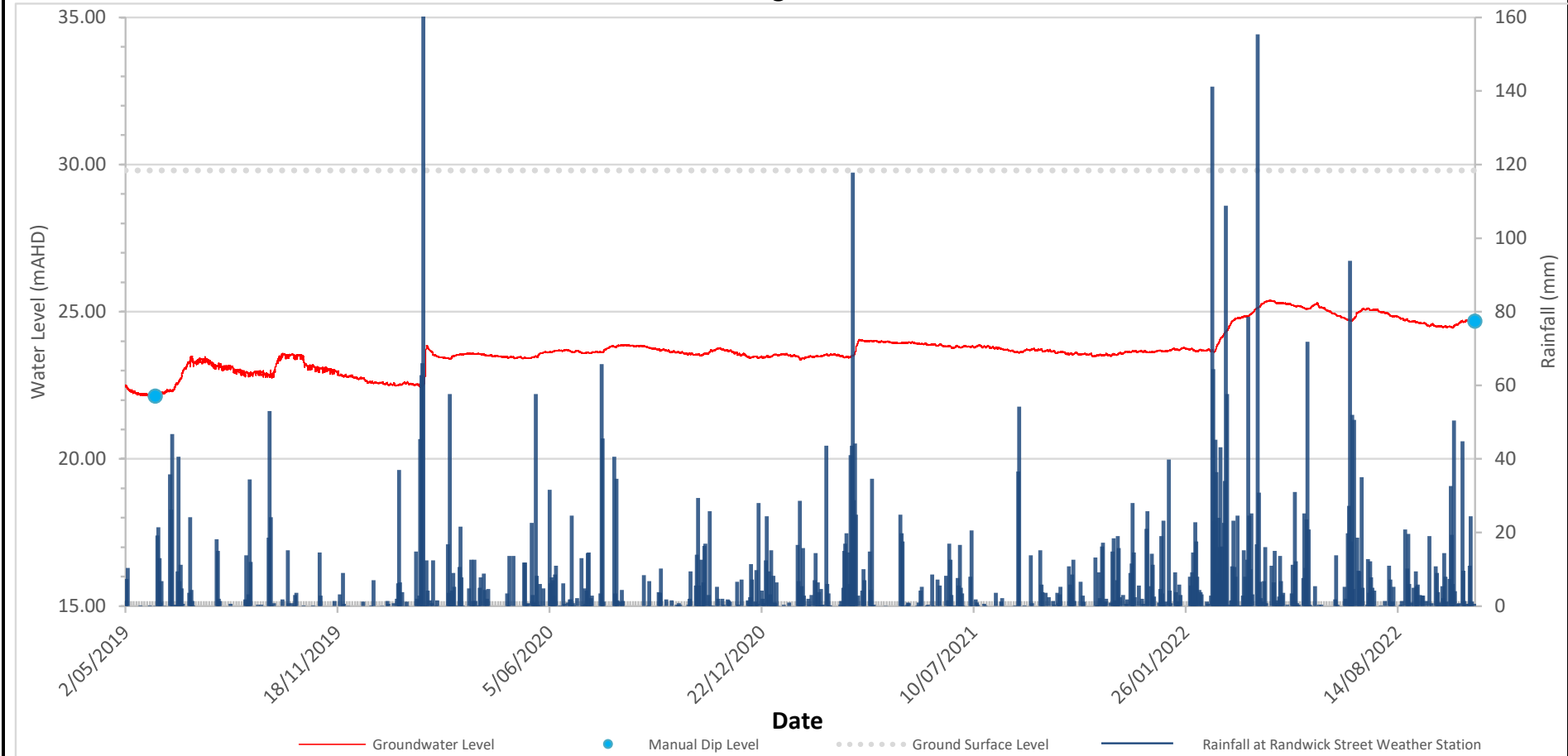
Note: Reading Interval = 1 hour



**From**  
02-05-19  
**To**  
26-10-22

**Drawn:**  
RAS  
**Date:**  
02-11-22

### Monitoring Well: EH08



**From**  
02-05-19  
**To**  
26-10-22

**Drawn:**  
RAS  
**Date:**  
02-11-22

## Permeability Testing - Falling Head Test Report

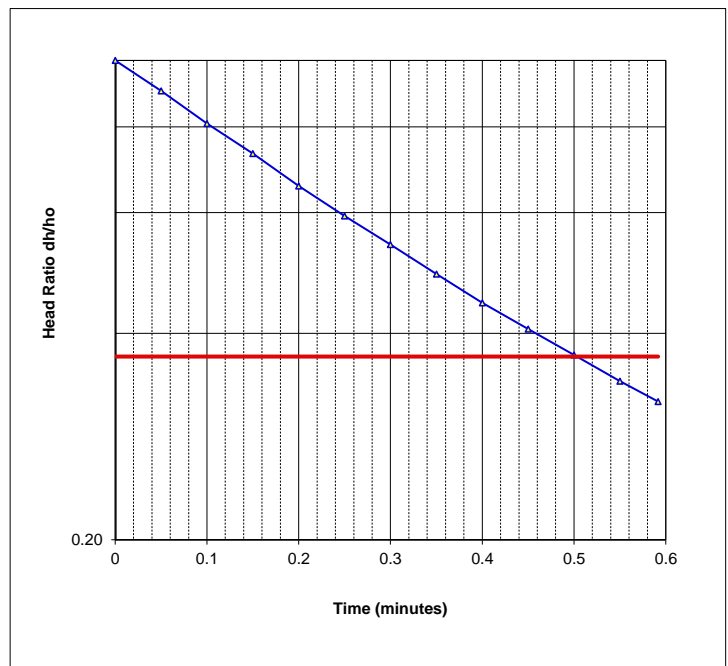
|           |                                   |             |           |
|-----------|-----------------------------------|-------------|-----------|
| Client:   | The University of New South Wales | Project No: | 227492.06 |
| Project:  | N13 Barker Street Development     | Test date:  | 8/5/2025  |
| Location: | Barker Street, Kensington NSW     | Tested by:  | I.Howsam  |

|                      |                       |                |            |
|----------------------|-----------------------|----------------|------------|
| <b>Test Location</b> | <b>Test No.</b>       | BH1            |            |
| Description:         | Standpipe in Borehole | Surface Level: | 26.8 m AHD |
| Material type:       | Aeolian Sands         |                |            |

|                                      |        |                                 |         |
|--------------------------------------|--------|---------------------------------|---------|
| <b>Details of Well Installation</b>  |        |                                 |         |
| Effective diameter (2re)             | 50 mm  | Depth to water before test      | 5.81 m  |
| Borehole diameter (2R)               | 76 mm  | Depth to water at start of test | 5.46 m  |
| Effective Length of well screen (Le) | 2.05 m | Depth of top of gravel pack     | 11.70 m |
|                                      |        | Depth of base of gravel pack    | 13.75 m |

### Test Results

| Time (min) | Depth (m) | Change in Head dH (m) | dH/Ho |
|------------|-----------|-----------------------|-------|
| 0.00       | 5.46      | 0.35                  | 1.000 |
| 0.05       | 5.50      | 0.31                  | 0.903 |
| 0.10       | 5.53      | 0.28                  | 0.809 |
| 0.15       | 5.56      | 0.25                  | 0.732 |
| 0.20       | 5.58      | 0.23                  | 0.656 |
| 0.25       | 5.60      | 0.21                  | 0.593 |
| 0.30       | 5.62      | 0.19                  | 0.539 |
| 0.35       | 5.64      | 0.17                  | 0.488 |
| 0.40       | 5.66      | 0.15                  | 0.443 |
| 0.45       | 5.67      | 0.14                  | 0.406 |
| 0.50       | 5.68      | 0.13                  | 0.372 |
| 0.55       | 5.69      | 0.12                  | 0.341 |
| 0.59       | 5.70      | 0.11                  | 0.318 |



To = 0.504 mins  
 30.25 secs

**Theory:** Rising Head Permeability calculated using equation by Hvorslev  
 $k = [r^2 \ln(L_e/R)] / 2Le T_o$  where r = radius of casing  
 R = radius of well screen  
 Le = length of well screen  
 To = time taken to rise or fall to 37% of initial change

|                               |            |                |       |
|-------------------------------|------------|----------------|-------|
| <b>Hydraulic Conductivity</b> | <b>k =</b> | <b>2.0E-05</b> | m/sec |
|                               | <b>=</b>   | <b>1.7E+00</b> | m/day |

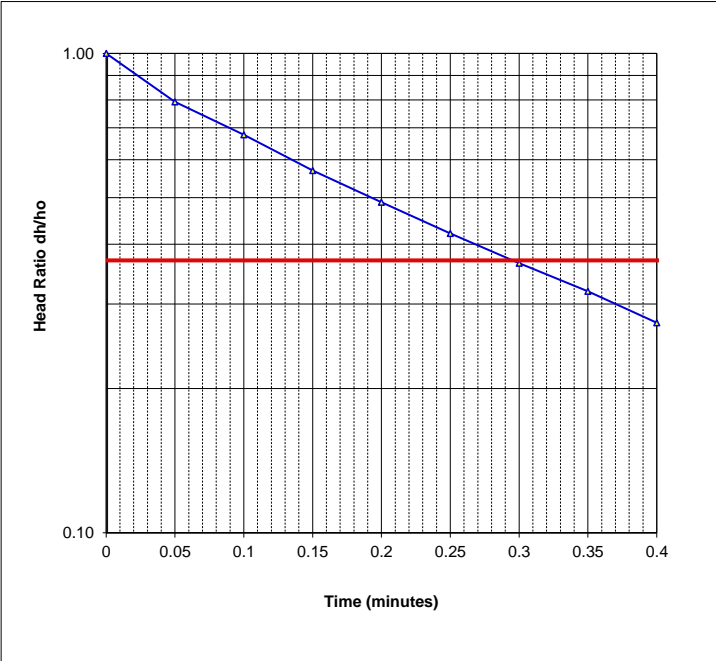
## Permeability Testing - Rising Head Test Report

|           |                                   |             |           |
|-----------|-----------------------------------|-------------|-----------|
| Client:   | The University of New South Wales | Project No: | 227492.06 |
| Project:  | N13 Barker Street Development     | Test date:  | 8/5/2025  |
| Location: | Barker Street, Kensington NSW     | Tested by:  | I.Howsam  |

|                      |                       |                |             |
|----------------------|-----------------------|----------------|-------------|
| <b>Test Location</b> | <b>Test No.</b>       | BH1            |             |
| Description:         | Standpipe in Borehole | Surface Level: | 26.81 m AHD |
| Material type:       | Aeolian Sands         |                |             |

|                                      |        |                                 |         |
|--------------------------------------|--------|---------------------------------|---------|
| <b>Details of Well Installation</b>  |        |                                 |         |
| Effective diameter (2re)             | 50 mm  | Depth to water before test      | 5.81 m  |
| Borehole diameter (2R)               | 76 mm  | Depth to water at start of test | 6.19 m  |
| Effective Length of well screen (Le) | 2.05 m | Depth of top of gravel pack     | 11.70 m |
|                                      |        | Depth of base of gravel pack    | 13.75 m |

|                     |           |                       |       |
|---------------------|-----------|-----------------------|-------|
| <b>Test Results</b> |           |                       |       |
| Time (min)          | Depth (m) | Change in Head dH (m) | dH/Ho |
| 0.00                | 6.19      | 0.38                  | 1.000 |
| 0.05                | 6.11      | 0.30                  | 0.793 |
| 0.10                | 6.06      | 0.25                  | 0.677 |
| 0.15                | 6.02      | 0.21                  | 0.570 |
| 0.20                | 5.99      | 0.18                  | 0.489 |
| 0.25                | 5.97      | 0.16                  | 0.421 |
| 0.30                | 5.95      | 0.14                  | 0.365 |
| 0.35                | 5.93      | 0.12                  | 0.319 |
| 0.40                | 5.91      | 0.10                  | 0.274 |
| 0.44                | 5.90      | 0.09                  | 0.242 |



To = 0.294 mins  
17.63 secs

|                |   |
|----------------|---|
| <b>Theory:</b> | Falling Head Permeability calculated using equation by Hvorslev<br>$k = [r^2 \ln(L_e/R)] / 2L_e T_o$<br>where r = radius of casing<br>R = radius of well screen<br>Le = length of well screen<br>To = time taken to rise or fall to 37% of initial change |
|----------------|---|

|                               |            |                |       |
|-------------------------------|------------|----------------|-------|
| <b>Hydraulic Conductivity</b> | <b>k =</b> | <b>3.4E-05</b> | m/sec |
|                               | <b>=</b>   | <b>3.0E+00</b> | m/day |

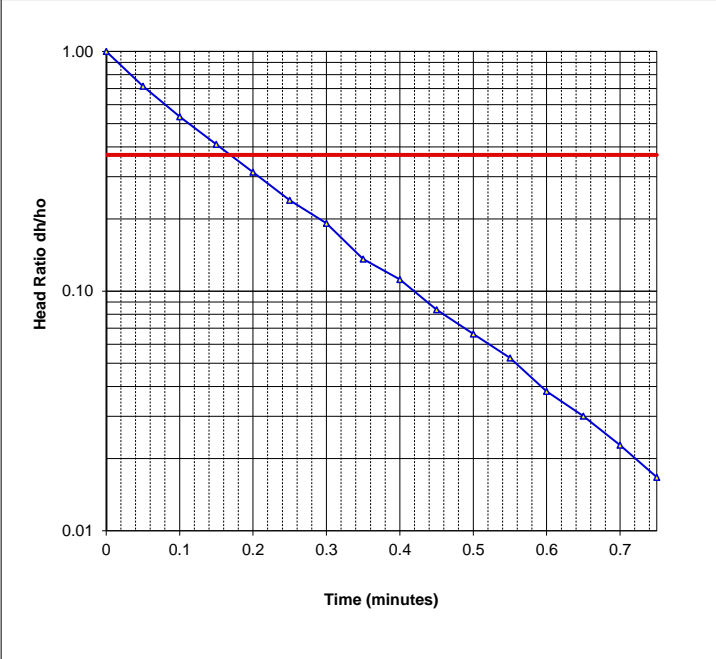
## Permeability Testing - Rising Head Test Report

|           |                                   |             |           |
|-----------|-----------------------------------|-------------|-----------|
| Client:   | The University of New South Wales | Project No: | 227492.06 |
| Project:  | N13 Barker Street Development     | Test date:  | 8/5/2025  |
| Location: | Barker Street, Kensington NSW     | Tested by:  | I.Howsam  |

|                      |                       |                |            |
|----------------------|-----------------------|----------------|------------|
| <b>Test Location</b> | <b>Test No.</b>       | BH2            |            |
| Description:         | Standpipe in Borehole | Surface Level: | 28.6 m AHD |
| Material type:       | Aeolian Sands         |                |            |

|                                      |        |                                 |         |
|--------------------------------------|--------|---------------------------------|---------|
| <b>Details of Well Installation</b>  |        |                                 |         |
| Effective diameter (2re)             | 50 mm  | Depth to water before test      | 7.4 m   |
| Borehole diameter (2R)               | 76 mm  | Depth to water at start of test | 7.85 m  |
| Effective Length of well screen (Le) | 2.10 m | Depth of top of gravel pack     | 9.40 m  |
|                                      |        | Depth of base of gravel pack    | 11.50 m |

|                     |           |                       |       |
|---------------------|-----------|-----------------------|-------|
| <b>Test Results</b> |           |                       |       |
| Time (min)          | Depth (m) | Change in Head dH (m) | dH/Ho |
| 0.00                | 7.85      | 0.45                  | 1.000 |
| 0.05                | 7.72      | 0.32                  | 0.716 |
| 0.10                | 7.64      | 0.24                  | 0.535 |
| 0.15                | 7.58      | 0.18                  | 0.409 |
| 0.20                | 7.54      | 0.14                  | 0.314 |
| 0.25                | 7.51      | 0.11                  | 0.239 |
| 0.30                | 7.49      | 0.09                  | 0.192 |
| 0.35                | 7.46      | 0.06                  | 0.136 |
| 0.40                | 7.45      | 0.05                  | 0.112 |
| 0.45                | 7.44      | 0.04                  | 0.084 |
| 0.50                | 7.43      | 0.03                  | 0.066 |
| 0.55                | 7.42      | 0.02                  | 0.053 |
| 0.60                | 7.42      | 0.02                  | 0.038 |
| 0.65                | 7.41      | 0.01                  | 0.030 |
| 0.70                | 7.41      | 0.01                  | 0.023 |
| 0.75                | 7.41      | 0.01                  | 0.017 |



To = 0.165 mins  
9.88 secs

**Theory:** Rising Head Permeability calculated using equation by Hvorslev  
 $k = [r^2 \ln(L_e/R)] / 2L_e T_o$  where  $r$  = radius of casing  
 $R$  = radius of well screen  
 $L_e$  = length of well screen  
 $T_o$  = time taken to rise or fall to 37% of initial change

|                               |            |                |       |
|-------------------------------|------------|----------------|-------|
| <b>Hydraulic Conductivity</b> | <b>k =</b> | <b>6.0E-05</b> | m/sec |
|                               | <b>=</b>   | <b>5.2E+00</b> | m/day |

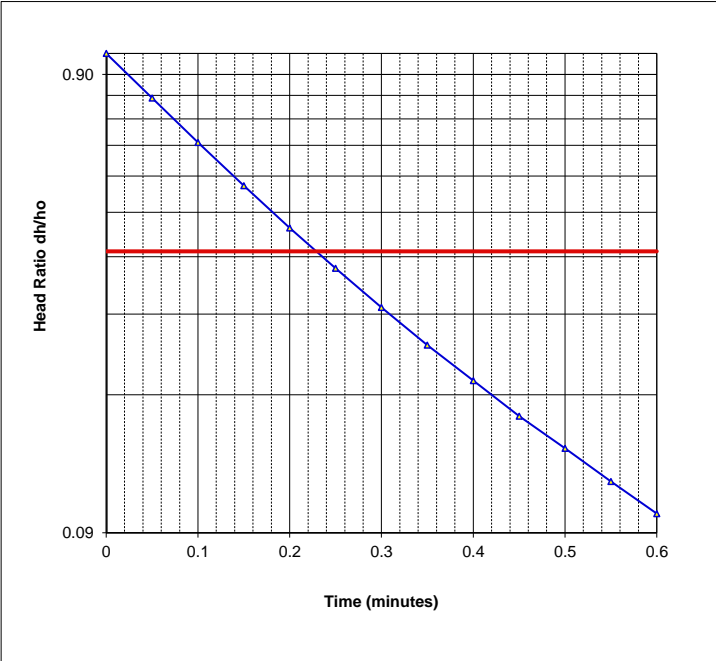
## Permeability Testing - Falling Head Test Report

|           |                                   |             |           |
|-----------|-----------------------------------|-------------|-----------|
| Client:   | The University of New South Wales | Project No: | 227492.06 |
| Project:  | N13 Barker Street Development     | Test date:  | 8/5/2025  |
| Location: | Barker Street, Kensington NSW     | Tested by:  | I.Howsam  |

|                      |                       |                |            |
|----------------------|-----------------------|----------------|------------|
| <b>Test Location</b> | <b>Test No.</b>       | BH2            |            |
| Description:         | Standpipe in Borehole | Surface Level: | 28.6 m AHD |
| Material type:       | Aeolian Sands         |                |            |

|                                      |        |                                 |         |
|--------------------------------------|--------|---------------------------------|---------|
| <b>Details of Well Installation</b>  |        |                                 |         |
| Effective diameter (2re)             | 50 mm  | Depth to water before test      | 7.4 m   |
| Borehole diameter (2R)               | 76 mm  | Depth to water at start of test | 7.01 m  |
| Effective Length of well screen (Le) | 2.10 m | Depth of top of gravel pack     | 9.40 m  |
|                                      |        | Depth of base of gravel pack    | 11.50 m |

|                     |           |                       |       |
|---------------------|-----------|-----------------------|-------|
| <b>Test Results</b> |           |                       |       |
| Time (min)          | Depth (m) | Change in Head dH (m) | dH/Ho |
| 0.00                | 7.01      | 0.39                  | 1.000 |
| 0.05                | 7.09      | 0.31                  | 0.799 |
| 0.10                | 7.15      | 0.25                  | 0.640 |
| 0.15                | 7.20      | 0.20                  | 0.515 |
| 0.20                | 7.24      | 0.16                  | 0.416 |
| 0.25                | 7.27      | 0.13                  | 0.340 |
| 0.30                | 7.29      | 0.11                  | 0.279 |
| 0.35                | 7.31      | 0.09                  | 0.231 |
| 0.40                | 7.33      | 0.07                  | 0.193 |
| 0.45                | 7.34      | 0.06                  | 0.162 |
| 0.50                | 7.35      | 0.05                  | 0.138 |
| 0.55                | 7.36      | 0.04                  | 0.117 |
| 0.60                | 7.36      | 0.04                  | 0.099 |



To = 0.229 mins  
13.75 secs

**Theory:** Falling Head Permeability calculated using equation by Hvorslev  
 $k = [r^2 \ln(L_e/R)] / 2L_e T_o$  where r = radius of casing  
 R = radius of well screen  
 Le = length of well screen  
 To = time taken to rise or fall to 37% of initial change

|                               |            |                |       |
|-------------------------------|------------|----------------|-------|
| <b>Hydraulic Conductivity</b> | <b>k =</b> | <b>4.3E-05</b> | m/sec |
|                               | <b>=</b>   | <b>3.8E+00</b> | m/day |

---

## **Appendix E**

### Laboratory Test Results

# Material Test Report

**Report Number:** 227492.06-1  
**Issue Number:** 1  
**Date Issued:** 27/05/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** N13 Barker Street Development Project  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12316  
**Sample Number:** SY-12316A  
**Date Sampled:** 05/05/2025  
**Dates Tested:** 08/05/2025 - 20/05/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH1 (0.1 - 0.4m)  
**Material:** FILL / Silty SAND: dark brown, trace gravel, fine to medium, sandstone gravel

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

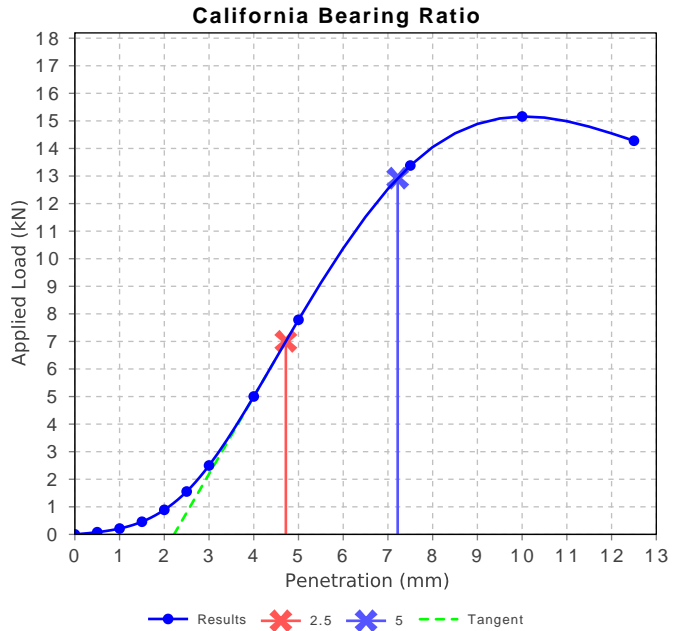


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 70                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.91                  |     |     |
| Optimum Moisture Content (%)                     | 11.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.0                 |     |     |
| Laboratory Moisture Ratio (%)                    | 98.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.92                  |     |     |
| Field Moisture Content (%)                       | 11.8                  |     |     |
| Moisture Content at Placement (%)                | 11.4                  |     |     |
| Moisture Content Top 30mm (%)                    | 12.2                  |     |     |
| Moisture Content Rest of Sample (%)              | 12.0                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 72.1                  |     |     |
| Swell (%)  | -0.5                  |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 3.0                   |     |     |



# Material Test Report

**Report Number:** 227492.06-1  
**Issue Number:** 1  
**Date Issued:** 27/05/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** N13 Barker Street Development Project  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12316  
**Sample Number:** SY-12316B  
**Date Sampled:** 06/05/2025  
**Dates Tested:** 08/05/2025 - 23/05/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH2 (0.1 - 0.4m)  
**Material:** FILL / Clayey SAND: orange-brown, with gravel, medium sand, medium to coarse, sandstone gravel, frequent sandstone cobbles

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

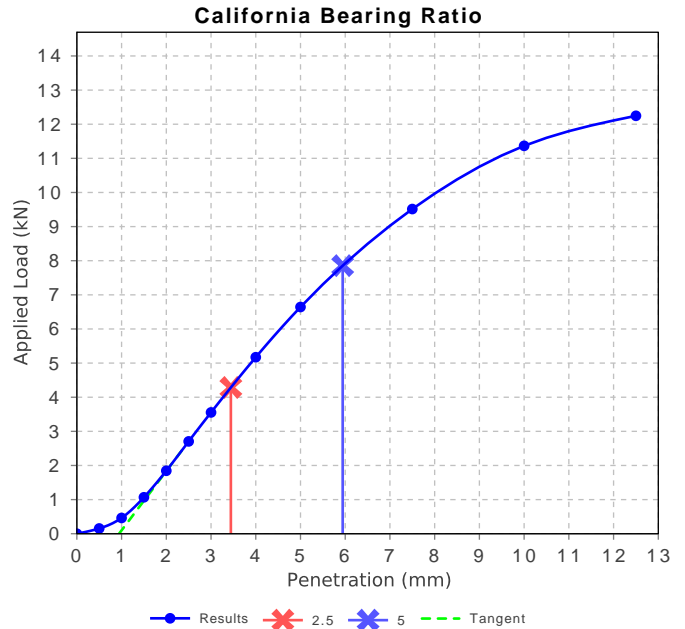


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                        | Min | Max |
|--|------------------------|-----|-----|
| CBR taken at                                     | 5 mm                   |     |     |
| CBR %  | 40                     |     |     |
| Method of Compactive Effort                      | Standard               |     |     |
| Method used to Determine MDD                     | TS 02795.06 & 02795.14 |     |     |
| Method used to Determine Plasticity              | Visual Assessment      |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 2.00                   |     |     |
| Optimum Moisture Content (%)                     | 10.5                   |     |     |
| Laboratory Density Ratio (%)                     | 100.0                  |     |     |
| Laboratory Moisture Ratio (%)                    | 102.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 2.00                   |     |     |
| Field Moisture Content (%)                       | 10.5                   |     |     |
| Moisture Content at Placement (%)                | 10.6                   |     |     |
| Moisture Content Top 30mm (%)                    | 11.9                   |     |     |
| Moisture Content Rest of Sample (%)              | 10.5                   |     |     |
| Mass Surcharge (kg)                              | 4.5                    |     |     |
| Soaking Period (days)                            | 4                      |     |     |
| Curing Hours (h)                                 | 241.2                  |     |     |
| Swell (%)  | 0.0                    |     |     |
| Oversize Material (mm)                           | 19                     |     |     |
| Oversize Material Included                       | Excluded               |     |     |
| Oversize Material (%)                            | 34.0                   |     |     |



# Material Test Report

**Report Number:** 227492.06-1  
**Issue Number:** 1  
**Date Issued:** 27/05/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** N13 Barker Street Development Project  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12316  
**Sample Number:** SY-12316C  
**Date Sampled:** 05/05/2025  
**Dates Tested:** 08/05/2025 - 23/05/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH5 (0.1 - 0.3m)  
**Material:** FILL / Silty SAND: dark brown, fine sand, trace igneous gravel, tree branches, ash and slag

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

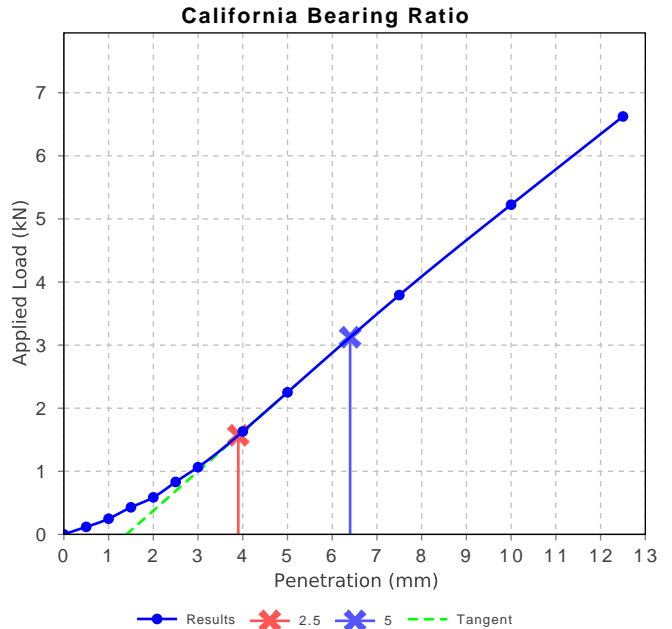


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 16                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.69                  |     |     |
| Optimum Moisture Content (%)                     | 16.5                  |     |     |
| Laboratory Density Ratio (%)                     | 103.0                 |     |     |
| Laboratory Moisture Ratio (%)                    | 100.5                 |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.74                  |     |     |
| Field Moisture Content (%)                       | 16.4                  |     |     |
| Moisture Content at Placement (%)                | 16.5                  |     |     |
| Moisture Content Top 30mm (%)                    | 18.6                  |     |     |
| Moisture Content Rest of Sample (%)              | 16.6                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 98.3                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 3.3                   |     |     |



# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW

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

**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590A  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department



Accredited for compliance with ISO/IEC 17025 - Testing



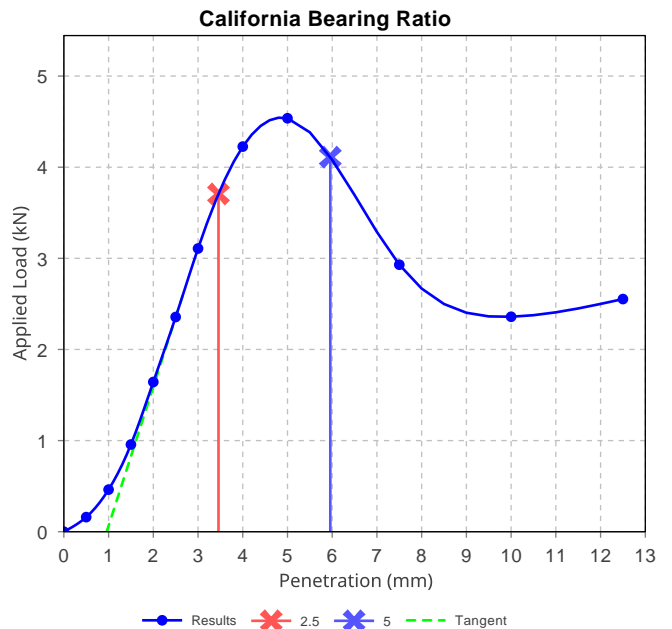
Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils

**Sample Location:** BH101 (0.4 - 0.9m)

**Material:** FILL / SAND: trace gravel, trace silt, pale grey and brown, fine to medium, igneous/slag, ripped sandstone gravel

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 30                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.69                  |     |     |
| Optimum Moisture Content (%)                     | 14.0                  |     |     |
| Laboratory Density Ratio (%)                     | 100.0                 |     |     |
| Laboratory Moisture Ratio (%)                    | 98.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.69                  |     |     |
| Field Moisture Content (%)                       | 3.0                   |     |     |
| Moisture Content at Placement (%)                | 14.0                  |     |     |
| Moisture Content Top 30mm (%)                    | 13.6                  |     |     |
| Moisture Content Rest of Sample (%)              | 14.0                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 65.7                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 0.0                   |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590A  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 25/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH101 (0.4 - 0.9m)  
**Material:** FILL / SAND: trace gravel, trace silt, pale grey and brown,  
 fine to medium, igneous/slag, ripped sandstone gravel

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



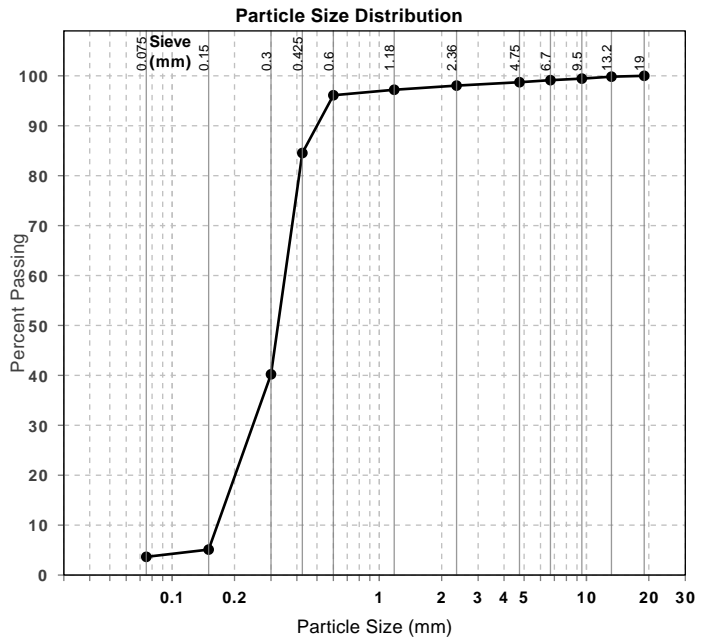
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 19 mm                                     | 100      |                |
| 13.2 mm                                   | 100      |                |
| 9.5 mm                                    | 99       |                |
| 6.7 mm                                    | 99       |                |
| 4.75 mm                                   | 99       |                |
| 2.36 mm                                   | 98       |                |
| 1.18 mm                                   | 97       |                |
| 0.6 mm                                    | 96       |                |
| 0.425 mm                                  | 85       |                |
| 0.3 mm                                    | 40       |                |
| 0.15 mm                                   | 5        |                |
| 0.075 mm                                  | 4        |                |



# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590B  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (0.5 - 1.0m)  
**Material:** FILL / SAND: trace silt, grey, pale grey, fine to medium, trace ceramics, plastic, metal, glass, ripped sandstone gravel, asbestos fragment



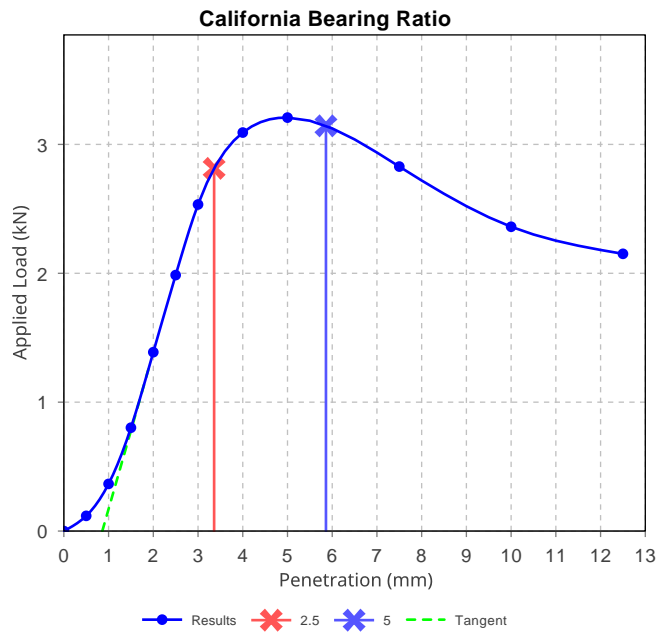
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 20                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.70                  |     |     |
| Optimum Moisture Content (%)                     | 14.0                  |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 98.0                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.72                  |     |     |
| Field Moisture Content (%)                       | 4.7                   |     |     |
| Moisture Content at Placement (%)                | 13.6                  |     |     |
| Moisture Content Top 30mm (%)                    | 15.7                  |     |     |
| Moisture Content Rest of Sample (%)              | 14.9                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 66.5                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 0                     |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW

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

**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590B  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 26/09/2025  
**Sampling Method:** Sampled by Engineering Department



Accredited for compliance with ISO/IEC 17025 - Testing

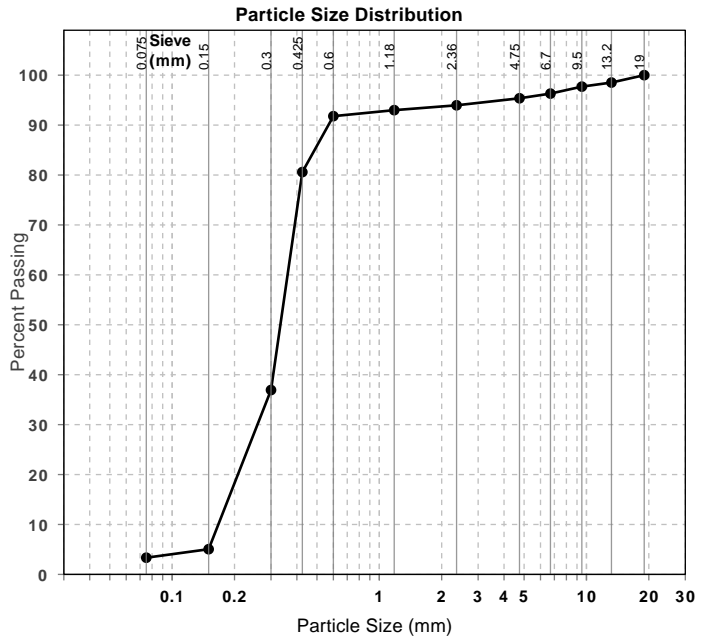
Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils

**Sample Location:** BH102 (0.5 - 1.0m)

**Material:** FILL / SAND: trace silt, grey, pale grey, fine to medium, trace ceramics, plastic, metal, glass, ripped sandstone gravel, asbestos fragment

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 19 mm                                     | 100      |                |
| 13.2 mm                                   | 99       |                |
| 9.5 mm                                    | 98       |                |
| 6.7 mm                                    | 96       |                |
| 4.75 mm                                   | 95       |                |
| 2.36 mm                                   | 94       |                |
| 1.18 mm                                   | 93       |                |
| 0.6 mm                                    | 92       |                |
| 0.425 mm                                  | 81       |                |
| 0.3 mm                                    | 37       |                |
| 0.15 mm                                   | 5        |                |
| 0.075 mm                                  | 3        |                |



# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590C  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.4 - 0.8m)  
**Material:** FILL / SAND: with gravel, with silt, pale grey and brown, medium to coarse, angular to sub-rounded, fine to medium sand, occasional cobble of ripped sandstone

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

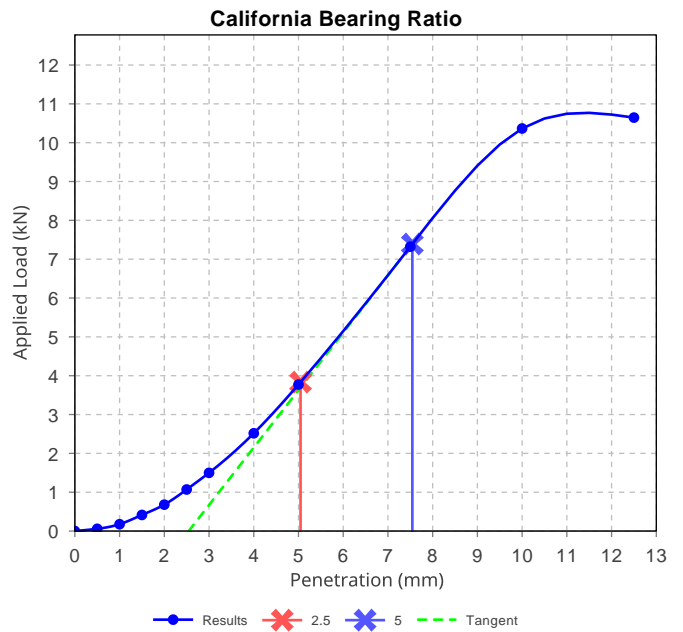


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 35                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.90                  |     |     |
| Optimum Moisture Content (%)                     | 12.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.0                 |     |     |
| Laboratory Moisture Ratio (%)                    | 97.0                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.90                  |     |     |
| Field Moisture Content (%)                       | 7.5                   |     |     |
| Moisture Content at Placement (%)                | 12.0                  |     |     |
| Moisture Content Top 30mm (%)                    | 12.9                  |     |     |
| Moisture Content Rest of Sample (%)              | 12.4                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 67.3                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 3.3                   |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590C  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 26/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.4 - 0.8m)  
**Material:** FILL / SAND: with gravel, with silt, pale grey and brown, medium to coarse, angular to sub-rounded, fine to medium sand, occasional cobble of ripped sandstone

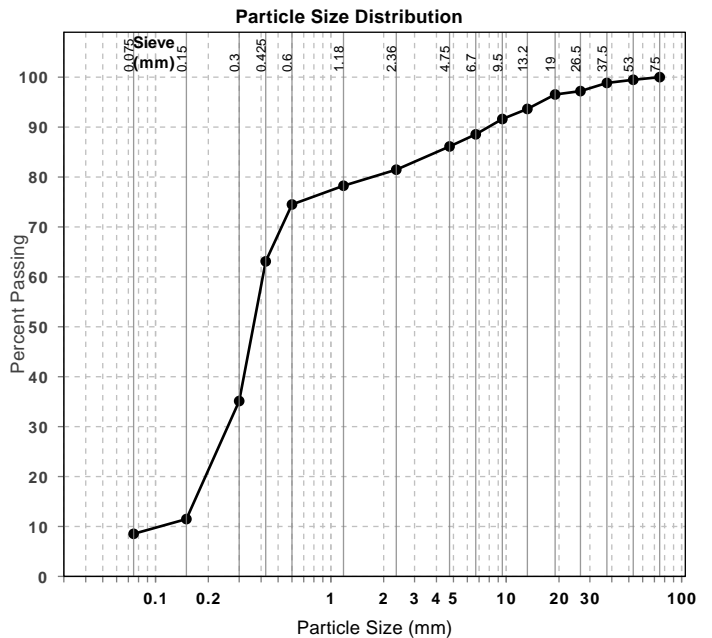
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 75 mm                                     | 100      |                |
| 53 mm                                     | 99       |                |
| 37.5 mm                                   | 99       |                |
| 26.5 mm                                   | 97       |                |
| 19 mm                                     | 97       |                |
| 13.2 mm                                   | 94       |                |
| 9.5 mm                                    | 92       |                |
| 6.7 mm                                    | 89       |                |
| 4.75 mm                                   | 86       |                |
| 2.36 mm                                   | 81       |                |
| 1.18 mm                                   | 78       |                |
| 0.6 mm                                    | 74       |                |
| 0.425 mm                                  | 63       |                |
| 0.3 mm                                    | 35       |                |
| 0.15 mm                                   | 11       |                |
| 0.075 mm                                  | 9        |                |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590D  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH104 (0.4 - 0.5m)  
**Material:** FILL / SAND: with gravel, with silt, trace clay, orange-dark brown, fine to medium, sandstone, charcoal, basalt gravel, rootlets

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



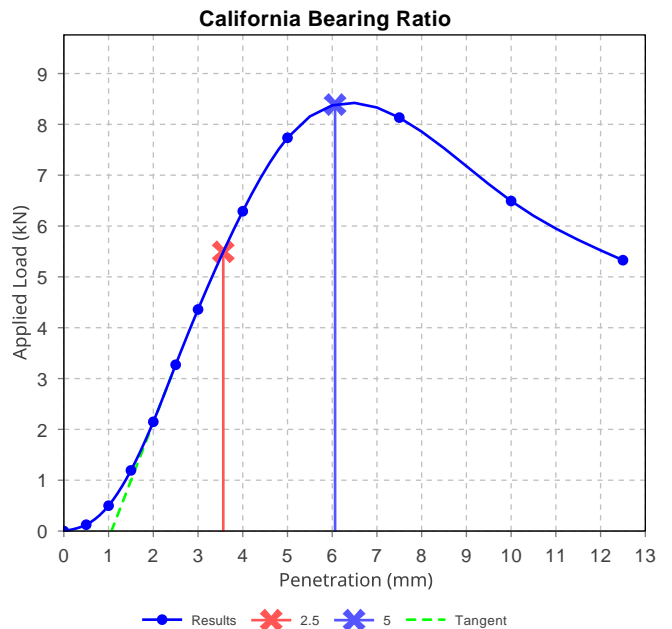
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 40                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.88                  |     |     |
| Optimum Moisture Content (%)                     | 12.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 99.0                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.89                  |     |     |
| Field Moisture Content (%)                       | 12.6                  |     |     |
| Moisture Content at Placement (%)                | 12.4                  |     |     |
| Moisture Content Top 30mm (%)                    | 13.1                  |     |     |
| Moisture Content Rest of Sample (%)              | 12.4                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 214.8                 |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 9.8                   |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590D  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 03/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH104 (0.4 - 0.5m)  
**Material:** FILL / SAND: with gravel, with silt, trace clay, orange-dark brown, fine to medium, sandstone, charcoal, basalt gravel, rootlets

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



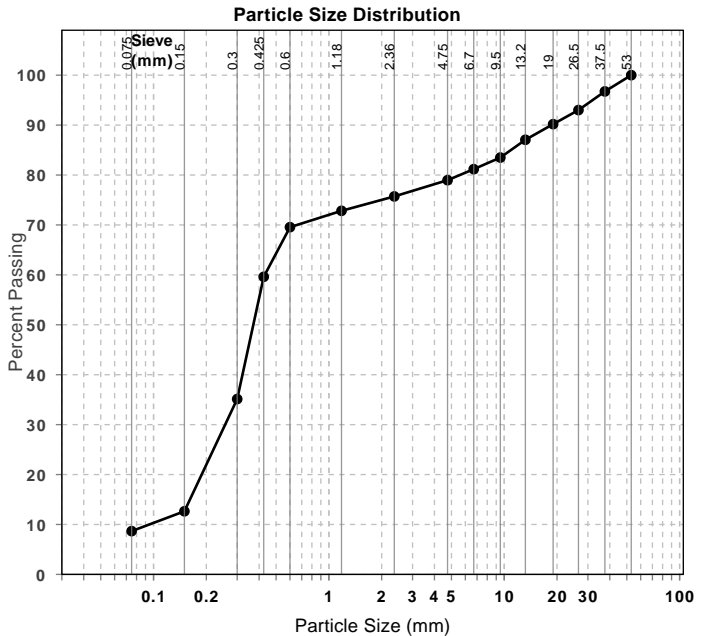
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 53 mm                                     | 100      |                |
| 37.5 mm                                   | 97       |                |
| 26.5 mm                                   | 93       |                |
| 19 mm                                     | 90       |                |
| 13.2 mm                                   | 87       |                |
| 9.5 mm                                    | 83       |                |
| 6.7 mm                                    | 81       |                |
| 4.75 mm                                   | 79       |                |
| 2.36 mm                                   | 76       |                |
| 1.18 mm                                   | 73       |                |
| 0.6 mm                                    | 70       |                |
| 0.425 mm                                  | 60       |                |
| 0.3 mm                                    | 35       |                |
| 0.15 mm                                   | 13       |                |
| 0.075 mm                                  | 9        |                |



| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |      | Min | Max |
|----------------------------------|------|-----|-----|
| Moisture Content (%)             | 12.6 |     |     |

# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590E  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH105 (0.5 - 1.5m)  
**Material:** FILL / SAND: with silt, trace clay, orange-brown, fine to medium, trace sandstone, charcoal, basalt gravel, rootlets

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

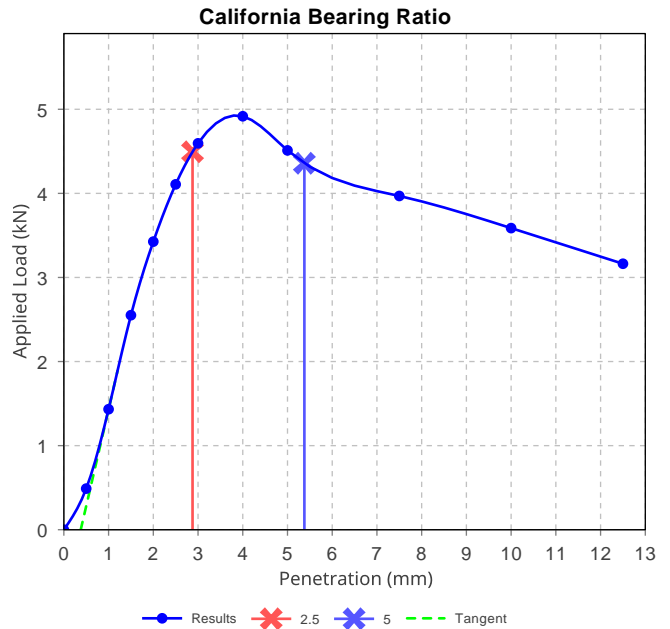


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 35                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.86                  |     |     |
| Optimum Moisture Content (%)                     | 10.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 99.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.87                  |     |     |
| Field Moisture Content (%)                       | 8.2                   |     |     |
| Moisture Content at Placement (%)                | 10.6                  |     |     |
| Moisture Content Top 30mm (%)                    | 13.8                  |     |     |
| Moisture Content Rest of Sample (%)              | 12.3                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 93.6                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 1.9                   |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW

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

**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590E  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 03/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*

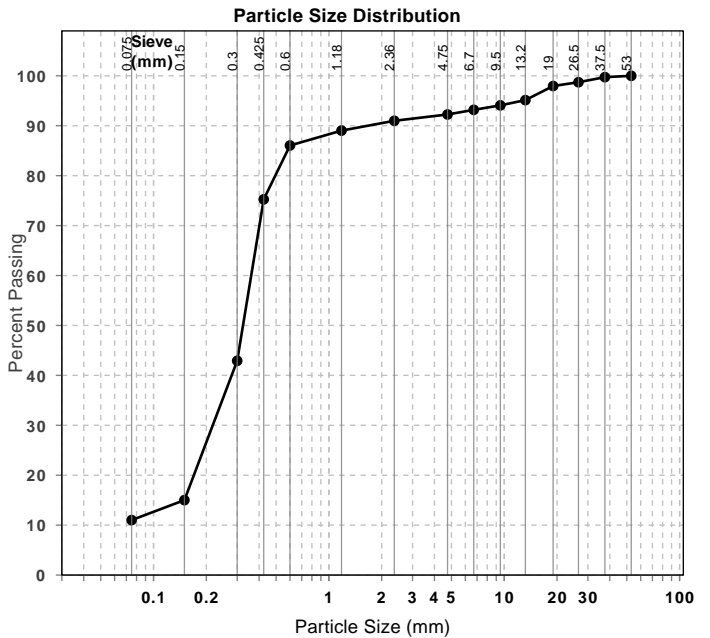


Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH105 (0.5 - 1.5m)  
**Material:** FILL / SAND: with silt, trace clay, orange-brown, fine to medium, trace sandstone, charcoal, basalt gravel, rootlets

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 53 mm                                     | 100      |                |
| 37.5 mm                                   | 100      |                |
| 26.5 mm                                   | 99       |                |
| 19 mm                                     | 98       |                |
| 13.2 mm                                   | 95       |                |
| 9.5 mm                                    | 94       |                |
| 6.7 mm                                    | 93       |                |
| 4.75 mm                                   | 92       |                |
| 2.36 mm                                   | 91       |                |
| 1.18 mm                                   | 89       |                |
| 0.6 mm                                    | 86       |                |
| 0.425 mm                                  | 75       |                |
| 0.3 mm                                    | 43       |                |
| 0.15 mm                                   | 15       |                |
| 0.075 mm                                  | 11       |                |



| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |     | Min | Max |
|----------------------------------|-----|-----|-----|
| Moisture Content (%)             | 8.2 |     |     |

# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590F  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH106 (0.15 - 0.45m)  
**Material:** FILL / SAND: with silt, with sandstone basalt, gravel, trace slag gravel and rootlets, dark grey-brown, fine to medium



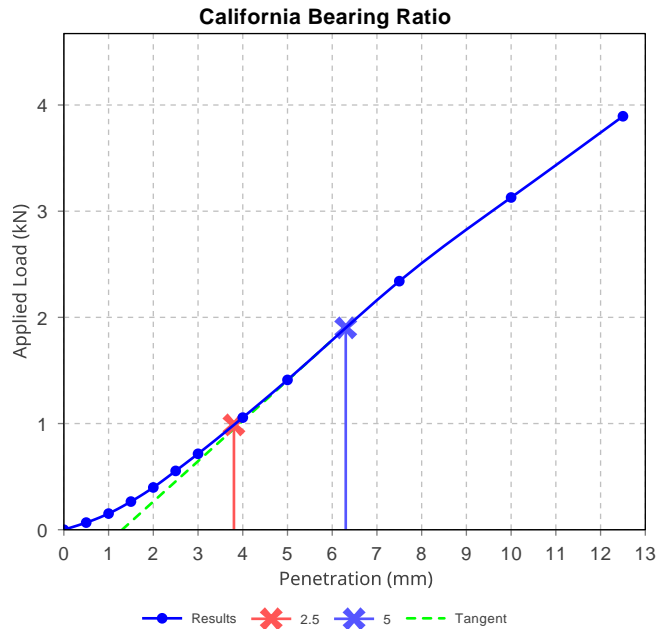
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 10                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.64                  |     |     |
| Optimum Moisture Content (%)                     | 20.0                  |     |     |
| Laboratory Density Ratio (%)                     | 99.5                  |     |     |
| Laboratory Moisture Ratio (%)                    | 100.5                 |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.64                  |     |     |
| Field Moisture Content (%)                       | 16.2                  |     |     |
| Moisture Content at Placement (%)                | 20.3                  |     |     |
| Moisture Content Top 30mm (%)                    | 20.4                  |     |     |
| Moisture Content Rest of Sample (%)              | 19.1                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 71.2                  |     |     |
| Swell (%)  | -0.5                  |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 4.0                   |     |     |



# Material Test Report



**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590F  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 08/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH106 (0.15 - 0.45m)  
**Material:** FILL / SAND: with silt, with sandstone basalt, gravel, trace slag gravel and rootlets, dark grey-brown, fine to medium

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



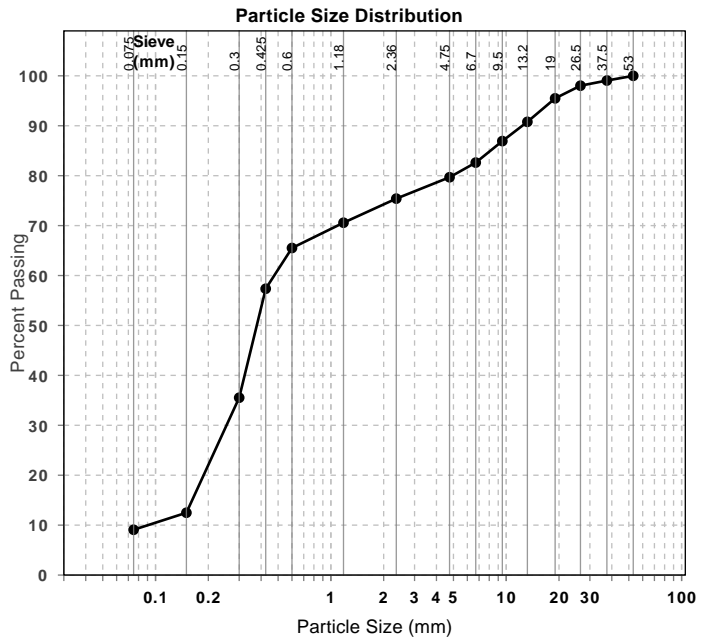
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 53 mm                                     | 100      |                |
| 37.5 mm                                   | 99       |                |
| 26.5 mm                                   | 98       |                |
| 19 mm                                     | 95       |                |
| 13.2 mm                                   | 91       |                |
| 9.5 mm                                    | 87       |                |
| 6.7 mm                                    | 83       |                |
| 4.75 mm                                   | 80       |                |
| 2.36 mm                                   | 75       |                |
| 1.18 mm                                   | 71       |                |
| 0.6 mm                                    | 66       |                |
| 0.425 mm                                  | 57       |                |
| 0.3 mm                                    | 36       |                |
| 0.15 mm                                   | 12       |                |
| 0.075 mm                                  | 9        |                |



# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590G  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 24/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH101 (0.4 - 0.5m)  
**Material:** FILL / SAND: trace gravel, trace silt, pale grey and brown,  
 fine to medium, igneous/slag, ripped sandstone gravel



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |     | Min | Max |
|----------------------------------|-----|-----|-----|
| Moisture Content (%)             | 2.2 |     |     |

# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590H  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (0.4 - 0.5m)  
**Material:** FILL / SAND: trace silt, grey, pale grey, fine to medium, trace ceramics, plastic, metal, glass, ripped sandstone gravel, asbestos fragment



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |     | Min | Max |
|----------------------------------|-----|-----|-----|
| Moisture Content (%)             | 5.2 |     |     |

# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590I  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.4 - 0.5m)  
**Material:** FILL / SAND: with gravel, with silt, pale grey and brown, medium to coarse, angular to sub-rounded, fine to medium sand, occasional cobble of ripped sandstone



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | 18                 |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |     | Min | Max |
|----------------------------------|-----|-----|-----|
| Moisture Content (%)             | 7.7 |     |     |

# Material Test Report

**Report Number:** 227492.06-2  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12590  
**Sample Number:** SY-12590J  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH106 (0.15 - 0.25m)  
**Material:** FILL / SAND: with silt, with sandstone basalt, gravel, trace slag gravel and rootlets, dark grey-brown, fine to medium



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |      | Min | Max |
|----------------------------------|------|-----|-----|
| Moisture Content (%)             | 11.5 |     |     |

# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591A  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 03/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH101 (0.25 - 0.4m)  
**Material:** FILL / SAND: trace gravel, trace silt, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous slag aggregates (basecourse)

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

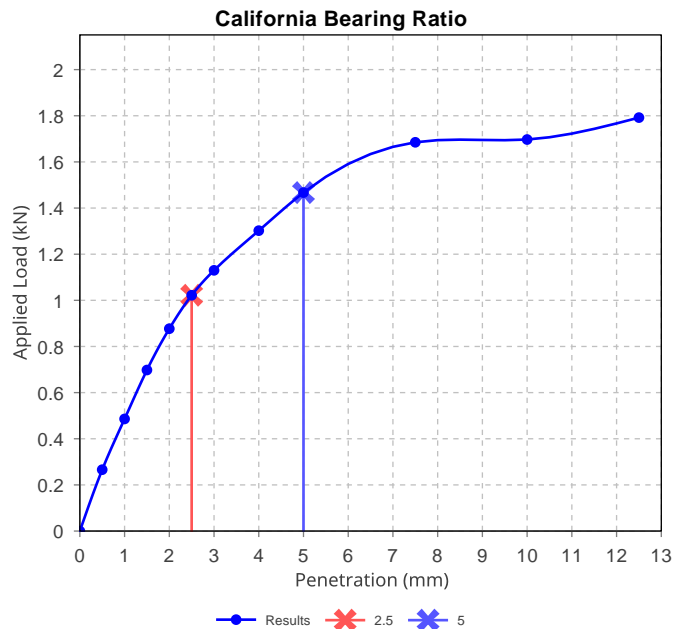


Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 8                     |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.64                  |     |     |
| Optimum Moisture Content (%)                     | 10.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 96.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.65                  |     |     |
| Field Moisture Content (%)                       | 3.7                   |     |     |
| Moisture Content at Placement (%)                | 9.9                   |     |     |
| Moisture Content Top 30mm (%)                    | 20.1                  |     |     |
| Moisture Content Rest of Sample (%)              | 22.9                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 116.9                 |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 2.4                   |     |     |



# Material Test Report



**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591A  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 24/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH101 (0.25 - 0.4m)  
**Material:** FILL / SAND: trace gravel, trace silt, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous slag aggregates (basecourse)

Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: mick.gref@douglaspartners.com.au



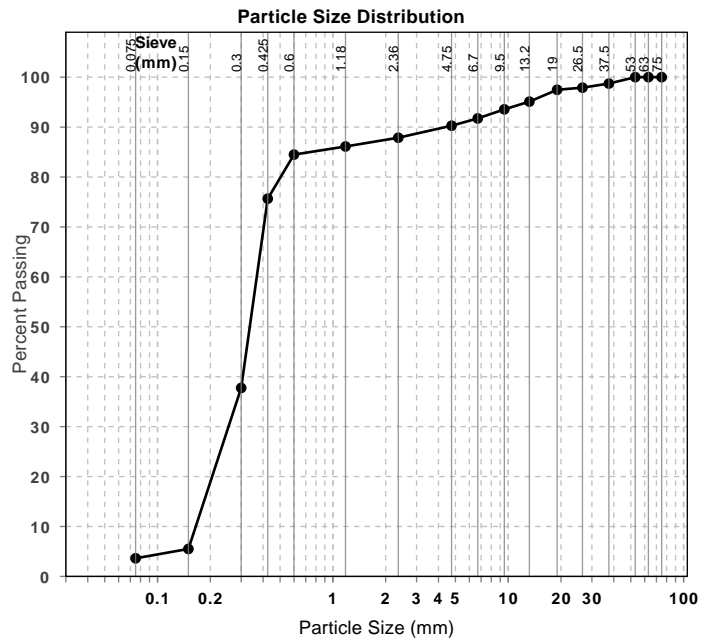
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref

Assistant Laboratory Manager

Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 53 mm                                     | 100      |                |
| 37.5 mm                                   | 99       |                |
| 26.5 mm                                   | 98       |                |
| 19 mm                                     | 97       |                |
| 13.2 mm                                   | 95       |                |
| 9.5 mm                                    | 94       |                |
| 6.7 mm                                    | 92       |                |
| 4.75 mm                                   | 90       |                |
| 2.36 mm                                   | 88       |                |
| 1.18 mm                                   | 86       |                |
| 0.6 mm                                    | 84       |                |
| 0.425 mm                                  | 76       |                |
| 0.3 mm                                    | 38       |                |
| 0.15 mm                                   | 6        |                |
| 0.075 mm                                  | 4        |                |



# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591B  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 03/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (0.05 - 0.35m)  
**Material:** FILL / SAND: with silt, with gravel, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)



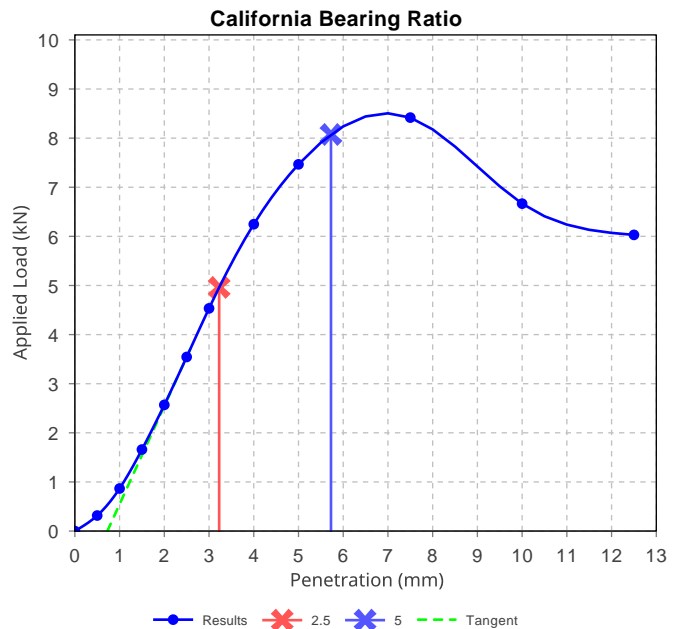
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 40                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.86                  |     |     |
| Optimum Moisture Content (%)                     | 9.5                   |     |     |
| Laboratory Density Ratio (%)                     | 99.5                  |     |     |
| Laboratory Moisture Ratio (%)                    | 101.5                 |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.86                  |     |     |
| Field Moisture Content (%)                       | 7.5                   |     |     |
| Moisture Content at Placement (%)                | 9.4                   |     |     |
| Moisture Content Top 30mm (%)                    | 13.2                  |     |     |
| Moisture Content Rest of Sample (%)              | 13.3                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 117.1                 |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 0.6                   |     |     |



# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591B  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 24/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (0.05 - 0.35m)  
**Material:** FILL / SAND: with silt, with gravel, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)



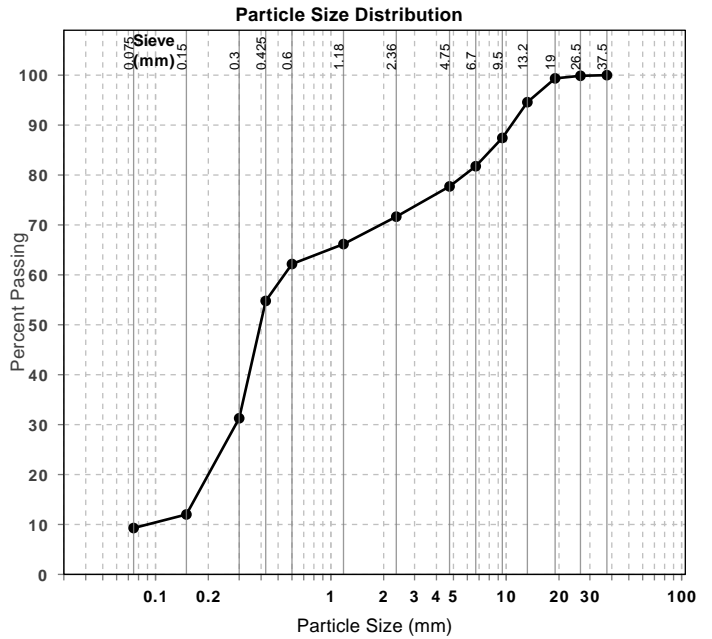
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 37.5 mm                                   | 100      |                |
| 26.5 mm                                   | 100      |                |
| 19 mm                                     | 99       |                |
| 13.2 mm                                   | 95       |                |
| 9.5 mm                                    | 87       |                |
| 6.7 mm                                    | 82       |                |
| 4.75 mm                                   | 78       |                |
| 2.36 mm                                   | 72       |                |
| 1.18 mm                                   | 66       |                |
| 0.6 mm                                    | 62       |                |
| 0.425 mm                                  | 55       |                |
| 0.3 mm                                    | 31       |                |
| 0.15 mm                                   | 12       |                |
| 0.075 mm                                  | 9        |                |



# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591C  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 03/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.1 - 0.4m)  
**Material:** FILL / Sandy GRAVEL: with silt, grey, medium to coarse, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)

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

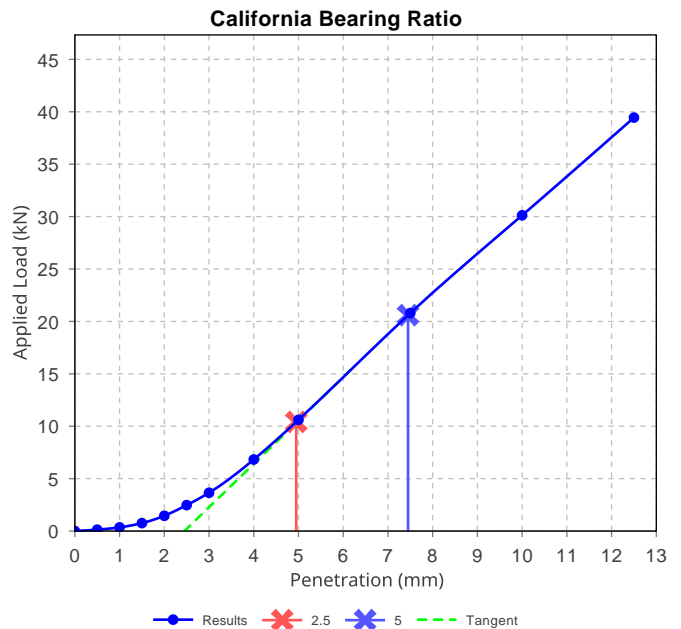


Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 5 mm                  |     |     |
| CBR %  | 100                   |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 2.17                  |     |     |
| Optimum Moisture Content (%)                     | 9.5                   |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 95.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 2.18                  |     |     |
| Field Moisture Content (%)                       | 7.0                   |     |     |
| Moisture Content at Placement (%)                | 9.0                   |     |     |
| Moisture Content Top 30mm (%)                    | 9.2                   |     |     |
| Moisture Content Rest of Sample (%)              | 9.0                   |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 118.1                 |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 2.0                   |     |     |



# Material Test Report



**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591C  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 24/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.1 - 0.4m)  
**Material:** FILL / Sandy GRAVEL: with silt, grey, medium to coarse, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)

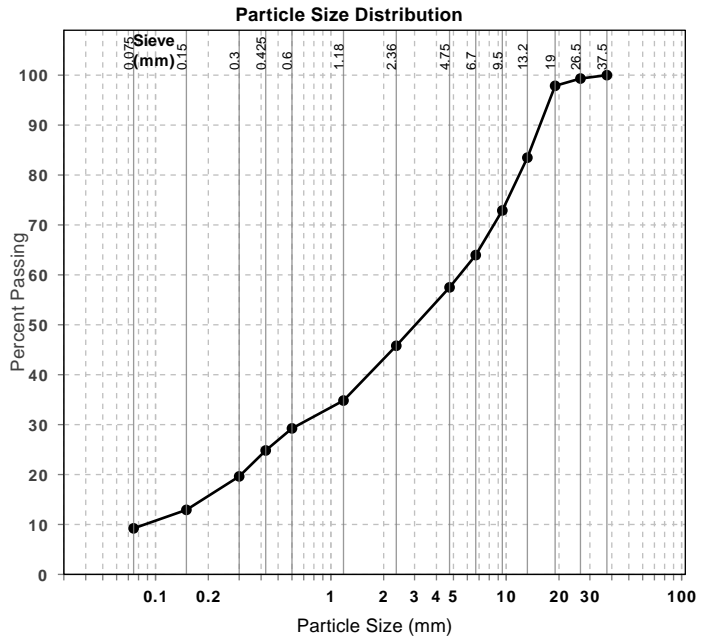
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 37.5 mm                                   | 100      |                |
| 26.5 mm                                   | 99       |                |
| 19 mm                                     | 98       |                |
| 13.2 mm                                   | 83       |                |
| 9.5 mm                                    | 73       |                |
| 6.7 mm                                    | 64       |                |
| 4.75 mm                                   | 57       |                |
| 2.36 mm                                   | 46       |                |
| 1.18 mm                                   | 35       |                |
| 0.6 mm                                    | 29       |                |
| 0.425 mm                                  | 25       |                |
| 0.3 mm                                    | 20       |                |
| 0.15 mm                                   | 13       |                |
| 0.075 mm                                  | 9        |                |



# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591D  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** **BH101 (0.25 - 0.3m)**  
**Material:** FILL / SAND: trace gravel, trace silt, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous slag aggregates (basecourse)



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |
| Moisture Content (AS 1289 2.1.1)               |                    | Min | Max |
| Moisture Content (%)                           | 5.8                |     |     |

# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591E  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (0.05 - 0.2m)  
**Material:** FILL / SAND: with silt, with gravel, grey, fine to medium, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |
| Moisture Content (AS 1289 2.1.1)               |                    | Min | Max |
| Moisture Content (%)                           | 9.6                |     |     |

# Material Test Report

**Report Number:** 227492.06-3  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12591  
**Sample Number:** SY-12591F  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.1 - 0.2m)  
**Material:** FILL / Sandy GRAVEL: with silt, grey, medium to coarse, angular to sub-rounded, fine to medium sand, igneous aggregates (basecourse)



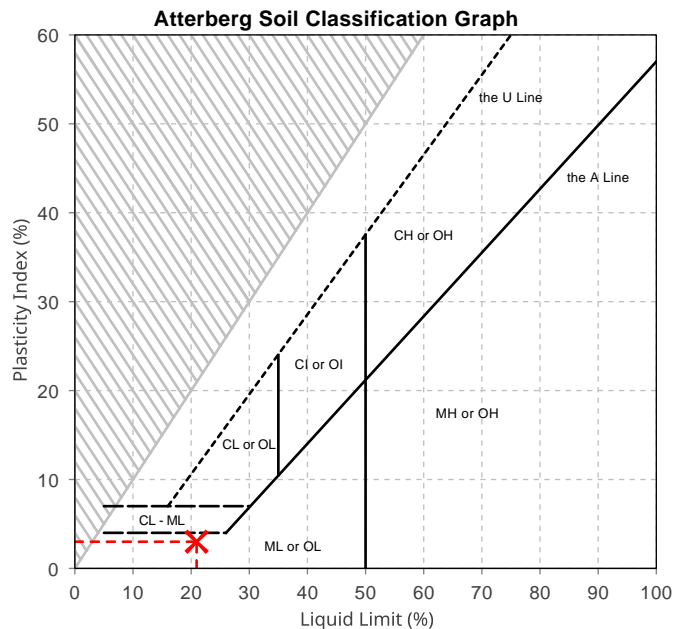
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |               | Min | Max |
|--|---------------|-----|-----|
| Sample History                                 | Oven Dried    |     |     |
| Preparation Method                             | Dry Sieve     |     |     |
| Liquid Limit (%)                               | 21            |     |     |
| Plastic Limit (%)                              | 18            |     |     |
| <b>Plasticity Index (%)</b>                    | <b>3</b>      |     |     |
| Linear Shrinkage (AS1289 3.4.1)                |               | Min | Max |
| Moisture Condition Determined By               | AS 1289.3.1.2 |     |     |
| <b>Linear Shrinkage (%)</b>                    | <b>2.0</b>    |     |     |
| Cracking Crumbling Curling                     | None          |     |     |
| Moisture Content (AS 1289 2.1.1)               |               | Min | Max |
| Moisture Content (%)                           | 7.3           |     |     |



# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593A  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH101 (1.4 - 1.5m)  
**Material:** SAND: pale grey, fine to medium



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |
| Moisture Content (AS 1289 2.1.1)               |                    | Min | Max |
| Moisture Content (%)                           | 1.4                |     |     |

# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593B  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH102 (1.4 - 1.5m)  
**Material:** SAND: pale grey, orange-brown, fine to medium



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |
| Moisture Content (AS 1289 2.1.1)               |                    | Min | Max |
| Moisture Content (%)                           | 2.1                |     |     |

# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593C  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 29/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH103 (0.9 - 1.0m)  
**Material:** SAND: pale grey, orange-brown, dark brown, fine to medium, indurated sand band



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



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1) |                    | Min | Max |
|--|--------------------|-----|-----|
| Sample History                                 | Oven Dried         |     |     |
| Preparation Method                             | Dry Sieve          |     |     |
| Liquid Limit (%)                               | Not Obtainable     |     |     |
| Plastic Limit (%)                              | Not Obtainable     |     |     |
| <b>Plasticity Index (%)</b>                    | <b>Non Plastic</b> |     |     |

| Moisture Content (AS 1289 2.1.1) |     | Min | Max |
|----------------------------------|-----|-----|-----|
| Moisture Content (%)             | 1.7 |     |     |

# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593D  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH104 (1.1 - 1.5m)  
**Material:** SAND: with silt, pale-grey, grey, fine to medium



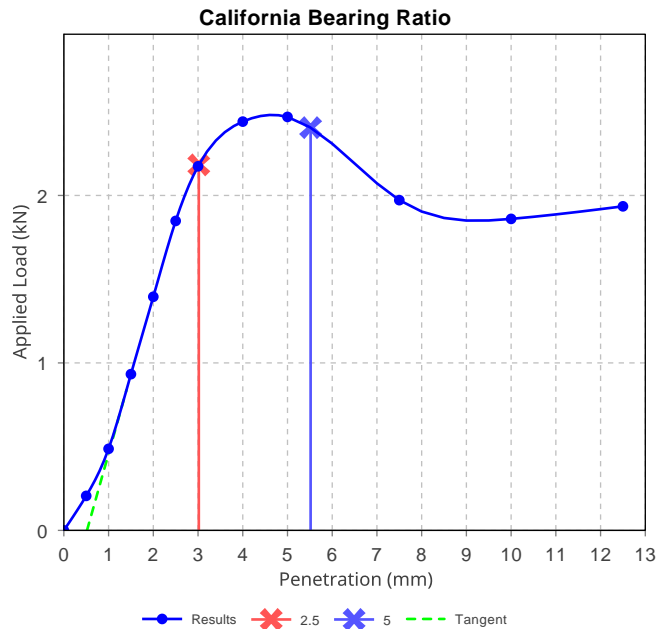
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 17                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.67                  |     |     |
| Optimum Moisture Content (%)                     | 13.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.0                 |     |     |
| Laboratory Moisture Ratio (%)                    | 98.0                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.68                  |     |     |
| Field Moisture Content (%)                       | 6.2                   |     |     |
| Moisture Content at Placement (%)                | 13.1                  |     |     |
| Moisture Content Top 30mm (%)                    | 17.1                  |     |     |
| Moisture Content Rest of Sample (%)              | 16.4                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 51.7                  |     |     |
| Swell (%)  | 0.0                   |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 0.1                   |     |     |



# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593D  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 30/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH104 (1.1 - 1.5m)  
**Material:** SAND: with silt, pale-grey, grey, fine to medium



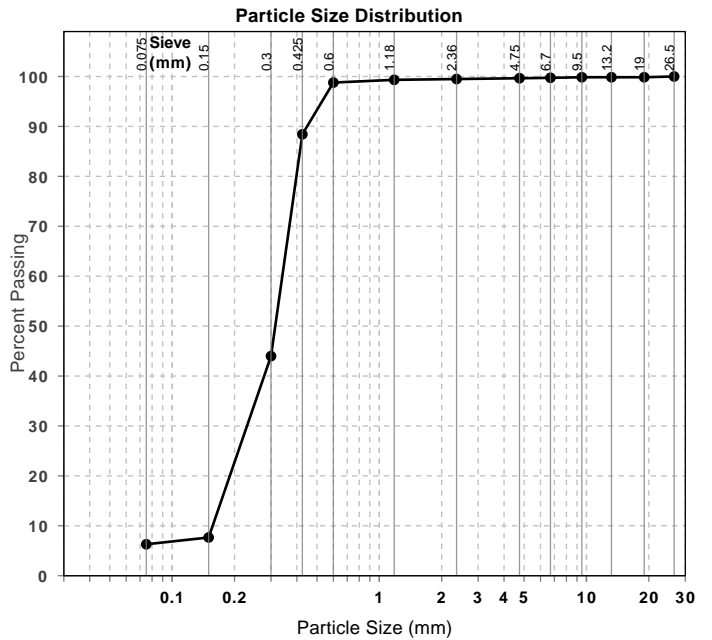
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 26.5 mm                                   | 100      |                |
| 19 mm                                     | 100      |                |
| 13.2 mm                                   | 100      |                |
| 9.5 mm                                    | 100      |                |
| 6.7 mm                                    | 100      |                |
| 4.75 mm                                   | 100      |                |
| 2.36 mm                                   | 99       |                |
| 1.18 mm                                   | 99       |                |
| 0.6 mm                                    | 99       |                |
| 0.425 mm                                  | 88       |                |
| 0.3 mm                                    | 44       |                |
| 0.15 mm                                   | 8        |                |
| 0.075 mm                                  | 6        |                |



# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593F  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 07/10/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH106 (0.7 - 1.5m)  
**Material:** SAND: trace silt, pale grey, grey, fine to medium



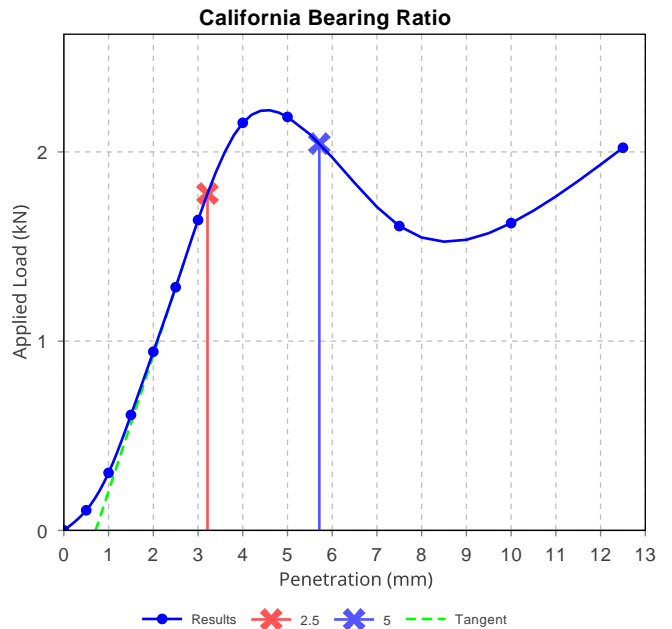
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| California Bearing Ratio (AS 1289 6.1.1 & 2.1.1) |                       | Min | Max |
|--|-----------------------|-----|-----|
| CBR taken at                                     | 2.5 mm                |     |     |
| CBR %  | 13                    |     |     |
| Method of Compactive Effort                      | Standard              |     |     |
| Method used to Determine MDD                     | AS 1289 5.1.1 & 2.1.1 |     |     |
| Method used to Determine Plasticity              | Visual Assessment     |     |     |
| Maximum Dry Density (t/m <sup>3</sup> )          | 1.62                  |     |     |
| Optimum Moisture Content (%)                     | 11.5                  |     |     |
| Laboratory Density Ratio (%)                     | 100.5                 |     |     |
| Laboratory Moisture Ratio (%)                    | 93.5                  |     |     |
| Dry Density after Soaking (t/m <sup>3</sup> )    | 1.63                  |     |     |
| Field Moisture Content (%)                       | 5.5                   |     |     |
| Moisture Content at Placement (%)                | 10.9                  |     |     |
| Moisture Content Top 30mm (%)                    | 18.4                  |     |     |
| Moisture Content Rest of Sample (%)              | 19.8                  |     |     |
| Mass Surcharge (kg)                              | 4.5                   |     |     |
| Soaking Period (days)                            | 4                     |     |     |
| Curing Hours (h)                                 | 48.4                  |     |     |
| Swell (%)  | -0.5                  |     |     |
| Oversize Material (mm)                           | 19                    |     |     |
| Oversize Material Included                       | Excluded              |     |     |
| Oversize Material (%)                            | 0.0                   |     |     |
| Placement moisture is 0.8% dry of OMC            |                       |     |     |



# Material Test Report

**Report Number:** 227492.06-4  
**Issue Number:** 1  
**Date Issued:** 09/10/2025  
**Client:** The University of New South Wales  
 PO Box 1, Kensington NSW  
**Contact:** Heather Blackman  
**Project Number:** 227492.06  
**Project Name:** UNSW N13 Barker Street Development  
**Project Location:** Barker Street, Kensington NSW  
**Work Request:** 12593  
**Sample Number:** SY-12593F  
**Date Sampled:** 12/09/2025  
**Dates Tested:** 16/09/2025 - 30/09/2025  
**Sampling Method:** Sampled by Engineering Department  
*The results apply to the sample as received*  
**Preparation Method:** AS 1289.1.1 - Sampling and Preparation of Soils  
**Sample Location:** BH106 (0.7 - 1.5m)  
**Material:** SAND: trace silt, pale grey, grey, fine to medium



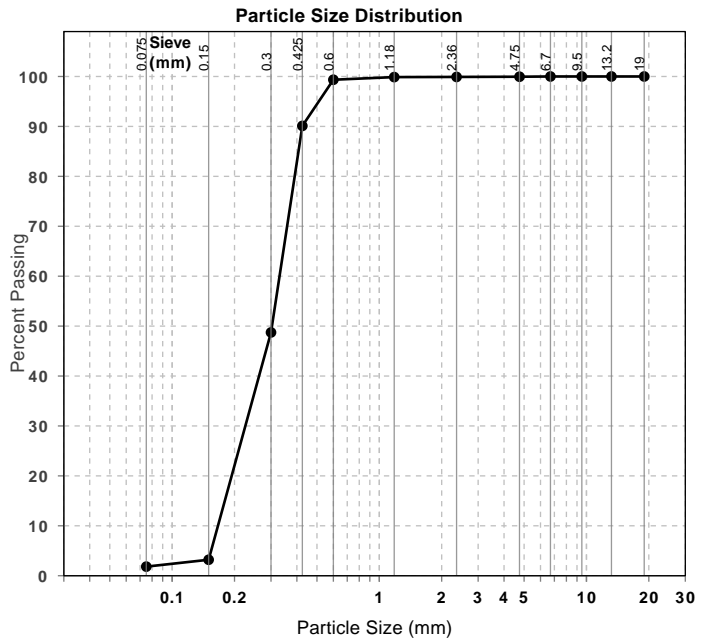
Douglas Partners Pty Ltd  
 Sydney Laboratory  
 96 Hermitage Road West Ryde NSW 2114  
 Phone: (02) 9809 0666  
 Email: mick.gref@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mick Gref  
 Assistant Laboratory Manager  
 Laboratory Accreditation Number: 828

| Particle Size Distribution (AS1289 3.6.1) |          |                |
|---|----------|----------------|
| Sieve                                     | Passed % | Passing Limits |
| 19 mm                                     | 100      |                |
| 13.2 mm                                   | 100      |                |
| 9.5 mm                                    | 100      |                |
| 6.7 mm                                    | 100      |                |
| 4.75 mm                                   | 100      |                |
| 2.36 mm                                   | 100      |                |
| 1.18 mm                                   | 100      |                |
| 0.6 mm                                    | 99       |                |
| 0.425 mm                                  | 90       |                |
| 0.3 mm                                    | 49       |                |
| 0.15 mm                                   | 3        |                |
| 0.075 mm                                  | 2        |                |





**Boral Construction Materials**  
Materials Technical Services

Unit 4, 3-5 Gibbon Road,  
Baulkham Hills NSW 2153 Australia  
PO Box 400,  
Winston Hills NSW 2153

T +61 (02) 9624 9900  
[boral.com.au](http://boral.com.au)

**TEST REPORT**

**CLIENT:** Douglas Partners Pty Ltd (West Ryde)

**FILE:** 89/25

**PROJECT:** Asphalt Core Testing. Project No. 227492.06 - Kensington

**REQUEST NO:** 120619

**DATE SAMPLED:** As Received

**DATE RECEIVED:** 16.09.25

**DATE TESTED:** 19.09.25

**LABORATORY SAMPLE NO:** 328419 - 328420

**TEST METHOD:** AS 2891.13.1 Determination of the Resilient Modulus of Asphalt- Indirect Tensile Method

| Client Sample ID              |                  | BH 102    | BH 103    |
|-------------------------------|------------------|-----------|-----------|
| Depth                         | m                | 0.0-0.05m | 0.0-0.10m |
| Time Tested                   |                  | 1:22 PM   | 2:28 PM   |
| Average Height                | mm               | 51.2      | 49.9      |
| Average Diameter              | mm               | 108.2     | 108.2     |
| Maximum Density               | t/m <sup>3</sup> | 2.476     | 2.461     |
| Bulk Density                  | t/m <sup>3</sup> | 2.231     | 2.413     |
| Air Voids                     | %                | 9.9       | 2.0       |
| Core Test Temperature         | °C               | 24.8      | 24.8      |
| Rise Time                     | s                | 0.038     | 0.043     |
| Pulse Repetition Period       | s                | 3.0       | 3.0       |
| Average Resilient Modulus MPa |                  | 4410      | 7210      |
| Coefficient of Variation      | %                | 1.1       | 1.6       |

Single specimens submitted by client & tested as received.

Approved signatory \_\_\_\_\_ George Prudnyk *G Prudnyk*  
Date 22.09.25 Serial no. ASP120619.GP.1



Accredited for compliance with ISO/IEC 17025 – Testing  
This report shall not be reproduced in full without the approval of the Boral MTS Laboratory.  
Test results in this Test Report relate only to the samples tested.

NATA Accredited Laboratory  
Number: 547

## CERTIFICATE OF ANALYSIS 380079

### Client Details

|                  |                                       |
|------------------|---------------------------------------|
| <b>Client</b>    | Douglas Partners Pty Ltd              |
| <b>Attention</b> | Peter Valenti                         |
| <b>Address</b>   | 96 Hermitage Rd, West Ryde, NSW, 2114 |

### Sample Details

|   |  |
|---|--|
| <b>Your Reference</b>                       | <b><u>227492.06 UNSW N13 Development</u></b> |
| <b>Number of Samples</b>                    | 6 Soil                                       |
| <b>Date samples received</b>                | 08/05/2025                                   |
| <b>Date completed instructions received</b> | 08/05/2025                                   |

### Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.  
 Samples were analysed as received from the client. Results relate specifically to the samples as received.  
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

### Report Details

|   |            |
|---|------------|
| <b>Date results requested by</b>  | 15/05/2025 |
| <b>Date of Issue</b>  | 13/05/2025 |
| NATA Accreditation Number 2901. This document shall not be reproduced except in full.                       |            |
| Accredited for compliance with ISO/IEC 17025 - Testing. <b>Tests not covered by NATA are denoted with *</b> |            |

#### Results Approved By

Diego Bigolin, Inorganics Supervisor

#### Authorised By

Nancy Zhang, Laboratory Manager

| Misc Inorg - Soil                      |          |            |            |            |            |            |
|--|----------|------------|------------|------------|------------|------------|
| Our Reference                          |          | 380079-1   | 380079-2   | 380079-3   | 380079-4   | 380079-5   |
| Your Reference                         | UNITS    | BH1        | BH1        | BH1        | BH2        | BH2        |
| Depth                                  |          | 1.4-1.5    | 5.5-5.95   | 13.0-13.2  | 2.5-2.95   | 8.5-8.77   |
| Date Sampled                           |          | 05/05/2025 | 05/05/2025 | 05/05/2025 | 06/05/2025 | 06/05/2025 |
| Type of sample                         |          | Soil       | Soil       | Soil       | Soil       | Soil       |
| Date prepared                          | -        | 12/05/2025 | 12/05/2025 | 12/05/2025 | 12/05/2025 | 12/05/2025 |
| Date analysed                          | -        | 12/05/2025 | 12/05/2025 | 12/05/2025 | 12/05/2025 | 12/05/2025 |
| pH 1:5 soil:water                      | pH Units | 7.3        | 6.9        | 6.2        | 6.5        | 6.6        |
| Electrical Conductivity 1:5 soil:water | µS/cm    | 54         | 22         | 59         | 98         | 22         |
| Chloride, Cl 1:5 soil:water            | mg/kg    | <10        | <10        | 10         | 10         | <10        |
| Sulphate, SO4 1:5 soil:water           | mg/kg    | <10        | <10        | <10        | 140        | <10        |

| Misc Inorg - Soil                      |          |            |
|--|----------|------------|
| Our Reference                          |          | 380079-6   |
| Your Reference                         | UNITS    | BH2        |
| Depth                                  |          | 5.5-5.95   |
| Date Sampled                           |          | 06/05/2025 |
| Type of sample                         |          | Soil       |
| Date prepared                          | -        | 12/05/2025 |
| Date analysed                          | -        | 12/05/2025 |
| pH 1:5 soil:water                      | pH Units | 6.6        |
| Electrical Conductivity 1:5 soil:water | µS/cm    | 21         |
| Chloride, Cl 1:5 soil:water            | mg/kg    | <10        |
| Sulphate, SO4 1:5 soil:water           | mg/kg    | 10         |

**Client Reference: 227492.06 UNSW N13 Development**

| Method ID        | Methodology Summary   |
|------------------|---|
| <b>Inorg-001</b> | pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.   |
| <b>Inorg-002</b> | Conductivity and Salinity - measured using a conductivity cell.   |
| <b>Inorg-081</b> | 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. |

Client Reference: 227492.06 UNSW N13 Development

| QUALITY CONTROL: Misc Inorg - Soil     |          |     |           |            |   | Duplicate  |            | Spike Recovery % |            |            |
|--|----------|-----|-----------|------------|---|------------|------------|------------------|------------|------------|
| Test Description                       | Units    | PQL | Method    | Blank      | # | Base       | Dup.       | RPD              | LCS-1      | 380079-2   |
| Date prepared                          | -        |     |           | 12/05/2025 | 1 | 12/05/2025 | 12/05/2025 |                  | 12/05/2025 | 12/05/2025 |
| Date analysed                          | -        |     |           | 12/05/2025 | 1 | 12/05/2025 | 12/05/2025 |                  | 12/05/2025 | 12/05/2025 |
| pH 1:5 soil:water                      | pH Units |     | Inorg-001 | [NT]       | 1 | 7.3        | 7.4        | 1                | 99         | [NT]       |
| Electrical Conductivity 1:5 soil:water | µS/cm    | 1   | Inorg-002 | <1         | 1 | 54         | 45         | 18               | 103        | [NT]       |
| Chloride, Cl 1:5 soil:water            | mg/kg    | 10  | Inorg-081 | <10        | 1 | <10        | <10        | 0                | 95         | 89         |
| Sulphate, SO4 1:5 soil:water           | mg/kg    | 10  | Inorg-081 | <10        | 1 | <10        | <10        | 0                | 96         | 97         |

## Result Definitions

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

## Quality Control Definitions

|  |  |
|--|--|
| <b>Blank</b>                           | 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.           |
| <b>Duplicate</b>                       | 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.   |
| <b>Matrix Spike</b>                    | 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. |
| <b>LCS (Laboratory Control Sample)</b> | 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.                                |
| <b>Surrogate Spike</b>                 | 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.                          |

## 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.

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.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.



---

## **Appendix F**

Previous Borehole Logs





DOUGLAS PARTNERS PTY LTD  
BUILDING COMPLEX SITE X·Y - KENSINGTON  
BORE 2 PROJ NO 14319C MAY 1997

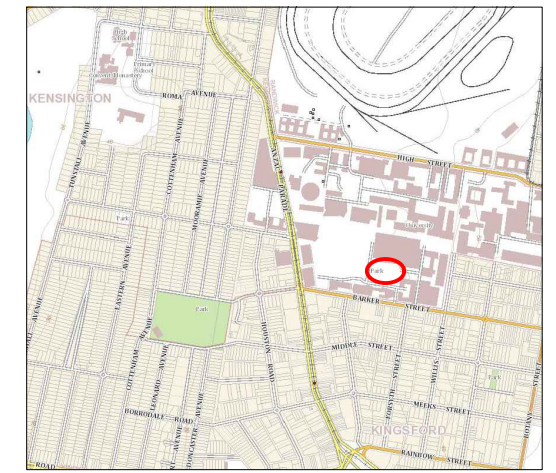
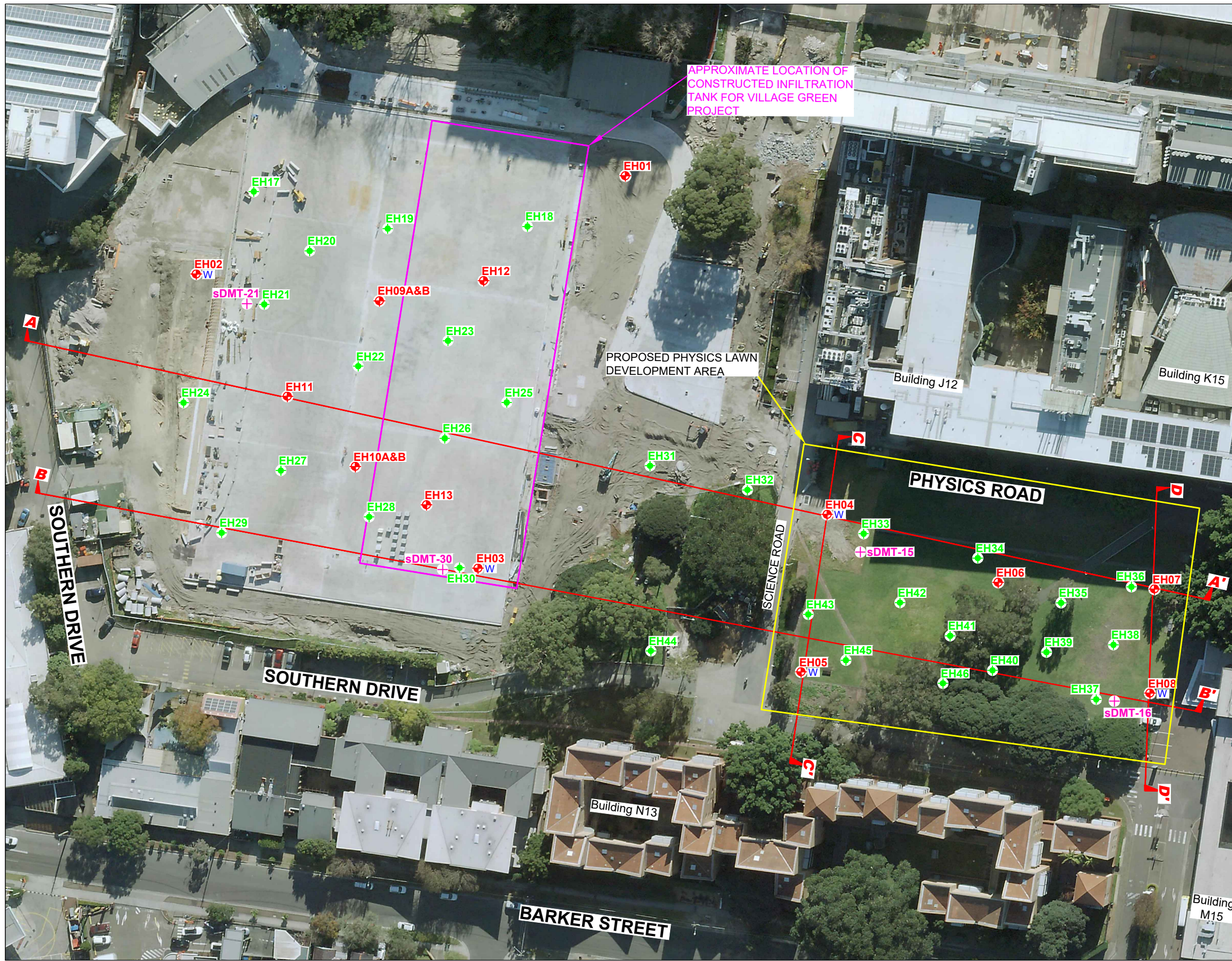


KODAK Color Control Patches  
11.90 - 16.00M  
KODAK Gray Scale

DOUGLAS PARTNERS PTY LTD  
BUILDING COMPLEX SITE X·Y - KENSINGTON  
BORE 2 PROJ NO 14319C MAY 1997

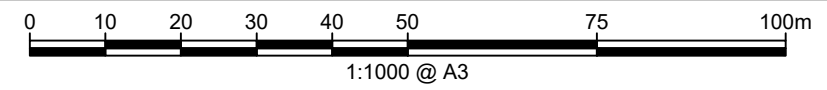


KODAK Color Control Patches  
16.00 - 17.45M  
KODAK Gray Scale



**SITE LOCALITY**

NOTE:  
1: Base image from Metromap.com.au (Dated 13.06.2022)



- LEGEND**
- Previous Tests:
- ⊕ Borehole
  - W Groundwater well
  - ◆ Piezocone Penetration Test
  - + Seismic Dilatometer Test
  - Interpreted Geotechnical Cross Section

|                                       |                  |
|---------------------------------------|------------------|
| CLIENT: University of New South Wales |                  |
| OFFICE: Sydney                        | DRAWN BY: CJ     |
| SCALE: 1:1000 @ A3                    | DATE: 02.11.2022 |

TITLE: **Location of Previous Tests**  
**Proposed UNSW Wellness Centre - Physics Lawn**  
**Science Road, Kensington**

|  |                       |
|--|-----------------------|
|  | PROJECT No: 207815.01 |
|  | DRAWING No: 1         |
|  | REVISION: 0           |

# BOREHOLE LOG

**CLIENT:** University of New South Wales  
**PROJECT:** UNSW Wellness Precinct  
**LOCATION:** Physics Lawn, UNSW, Kensington

**SURFACE LEVEL:** 27.8 AHD  
**EASTING:** 336286.8  
**NORTHING:** 6245399  
**DIP/AZIMUTH:** 90°/--

**BORE No:** EH05  
**PROJECT No:** 86763.00  
**DATE:** 30/4 - 1/5/2019  
**SHEET 1 OF 2**

| RL | Depth (m) | Description of Strata  | Degree of Weathering |    |    |    |    | Graphic Log | Rock Strength |          |     |        |      | Water | Fracture Spacing (m) | Discontinuities |         | Sampling & In Situ Testing |      |      |      |      |             |           |           |                      |
|----|-----------|--|----------------------|----|----|----|----|-------------|---------------|----------|-----|--------|------|-------|----------------------|-----------------|---------|----------------------------|------|------|------|------|-------------|-----------|-----------|----------------------|
|    |           |  | EW                   | HW | MW | SW | FR |             | Ex Low        | Very Low | Low | Medium | High |       |                      | Very High       | Ex High | 0.01                       | 0.05 | 0.10 | 0.50 | 1.00 | B - Bedding | J - Joint | S - Shear | F - Fault            |
|    | 0.6       | FILLING: dark brown, silty sand filling with some clay trace gravel, roots in top 0.3m, dry to moist     |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | A           |           |           |                      |
|    | 1         | SAND: loose to medium dense, dark grey-brown and pale brown, fine to medium sand, dry to moist (aeolian) |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | A           |           |           |                      |
|    | 1.7m      | pale grey  |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 4,4,5<br>N = 9       |
|    | 2         | 2.2m: grey, grey-brown and brown   |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | A           |           |           |                      |
|    | 3         | 3.0m: orange-brown   |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 8,8,9<br>N = 17      |
|    | 4         | 5.0m: medium dense, yellow-grey  |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | A           |           |           |                      |
|    | 5         | 5.5m: moist to wet   |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 4,5,4<br>N = 9       |
|    | 6.5       | SAND: dense to very dense, pale grey brown, fine to medium grained sand, moist to wet (aeolian)          |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | A           |           |           |                      |
|    | 7         |  |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 5,9,13<br>N = 22     |
|    | 8.0       | SANDSTONE: extremely to very low strength pale grey brown, fine to medium grained sandstone              |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 13,25,25<br>N = 50   |
|    | 8         |  |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 20,25/100<br>refusal |
|    | 9         |  |                      |    |    |    |    |             |               |          |     |        |      |       |                      |                 |         |                            |      |      |      |      | S           |           |           | 25/130<br>refusal    |

**RIG:** Scout 1      **DRILLER:** SS      **LOGGED:** AH / SI      **CASING:** HW to 5.5m  
**TYPE OF BORING:** SFA (TC bit) to 5.5m; R to 10.9m; NMLC coring to 18.16m  
**WATER OBSERVATIONS:** No free groundwater observed whilst augering  
**REMARKS:** Well installed - screened from 6.3m to 9.3m; BD03/01/0519 taken at 2.4-2.5m;

| SAMPLING & IN SITU TESTING LEGEND |                      |       |  |
|-----------------------------------|----------------------|-------|--|
| A                                 | Auger sample         | G     | Gas sample                             |
| B                                 | Bulk sample          | P     | Piston sample                          |
| BLK                               | Block sample         | U     | Tube sample (x mm dia.)                |
| C                                 | Core drilling        | W     | Water sample                           |
| D                                 | Disturbed sample     | W     | Water seep                             |
| E                                 | Environmental sample | W     | Water level                            |
|                                   |                      | PLD   | Photo ionisation detector (ppm)        |
|                                   |                      | PL(A) | Point load axial test Is(50) (MPa)     |
|                                   |                      | PL(D) | Point load diametral test Is(50) (MPa) |
|                                   |                      | gp    | Pocket penetrometer (kPa)              |
|                                   |                      | S     | Standard penetration test              |
|                                   |                      | V     | Shear vane (kPa)                       |



# BOREHOLE LOG

**CLIENT:** University of New South Wales  
**PROJECT:** UNSW Wellness Precinct  
**LOCATION:** Physics Lawn, UNSW, Kensington

**SURFACE LEVEL:** 27.8 AHD  
**EASTING:** 336286.8  
**NORTHING:** 6245399  
**DIP/AZIMUTH:** 90°/--

**BORE No:** EH05  
**PROJECT No:** 86763.00  
**DATE:** 30/4 - 1/5/2019  
**SHEET 2 OF 2**

| RL | Depth (m) | Description of Strata  | Degree of Weathering |    |    |    | Graphic Log | Rock Strength |    |        |          |     | Water | Fracture Spacing (m)  | Discontinuities                                 |      | Sampling & In Situ Testing |         |             |           |              |              |
|----|-----------|--|----------------------|----|----|----|-------------|---------------|----|--------|----------|-----|-------|---|---|------|----------------------------|---------|-------------|-----------|--------------|--------------|
|    |           |  | EW                   | HW | MW | SW |             | FS            | FR | Ex Low | Very Low | Low |       |   | Medium  | High | Very High                  | Ex High | B - Bedding | J - Joint | S - Shear    | F - Fault    |
|    | 10.8      | SANDSTONE: extremely to very low strength pale grey brown, fine to medium grained sandstone (continued)  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           |              |              |
|    | 11        | SANDSTONE: medium strength, moderately weathered then fresh, slightly fractured, pale grey with some red iron staining, medium to coarse grained sandstone |                      |    |    |    |             |               |    |        |          |     |       |   | 10.92m: J, 25° PL<br>10.95-11.12m: B(x3) 5°, pl |      |                            |         | C           | 100       | 82           | PL(A) = 0.52 |
|    | 12        |  |                      |    |    |    |             |               |    |        |          |     |       | 11.78-11.84m: B(x2) 0-5°, pl<br>11.89m: J, 85°, pl<br>12.06m: B, 5°, pl, ro, stn fe |   |      |                            |         |             |           | PL(A) = 0.67 |              |
|    | 13        |  |                      |    |    |    |             |               |    |        |          |     |       | 12.74m: J, 20°, pl, ro, stn, fe   |   |      |                            | C       | 100         | 97        | PL(A) = 0.56 |              |
|    | 13.46     | SANDSTONE: high strength, fresh, unbroken, pale grey, medium grained sandstone, with some carbonaceous flecks  |                      |    |    |    |             |               |    |        |          |     |       | 13.27m: B, 10°, pl, Un cbs<br>13.39m: PS 5mm<br>13.73-13.76m:                       |   |      |                            |         |             |           | PL(A) = 0.93 |              |
|    | 14        |  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            | C       | 100         | 100       | PL(A) = 1.4  |              |
|    | 15        |  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           | PL(A) = 1.2  |              |
|    | 16        |  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           | PL(A) = 1.1  |              |
|    | 17        |  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           | PL(A) = 1.3  |              |
|    | 18.16     | Bore discontinued at 18.16m  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           |              |              |
|    | 19        |  |                      |    |    |    |             |               |    |        |          |     |       |   |   |      |                            |         |             |           |              |              |

**RIG:** Scout 1      **DRILLER:** SS      **LOGGED:** AH / SI      **CASING:** HW to 5.5m  
**TYPE OF BORING:** SFA (TC bit) to 5.5m; R to 10.9m; NMLC coring to 18.16m  
**WATER OBSERVATIONS:** No free groundwater observed whilst augering  
**REMARKS:** Well installed - screened from 6.3m to 9.3m; BD03/01/0519 taken at 2.4-2.5m;

|                        |                           |  |
|------------------------|---------------------------|--|
| A Auger sample         | G Gas sample              | PID Photo ionisation detector (ppm)          |
| B Bulk sample          | P Piston sample           | PL(A) Point load axial test Is(50) (MPa)     |
| BLK Block sample       | U Tube sample (x mm dia.) | PL(D) Point load diametral test Is(50) (MPa) |
| C Core drilling        | W Water sample            | pp Pocket penetrometer (kPa)                 |
| D Disturbed sample     | > Water seep              | S Standard penetration test                  |
| E Environmental sample | ≡ Water level             | V Shear vane (kPa)                           |



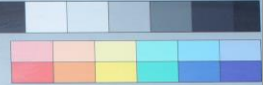
BORE: EH05

PROJECT: UNSW (86763.00)

MAY 2019



Project No: 86763.00  
BH ID: EH 5  
Depth: 10.90 - 15.00m  
Core Box No.: 1



10.90 - 15.00m

BORE: EH05

PROJECT: UNSW (86763.00)

MAY 2019



Project No: 86763.00  
BH ID: EH 5  
Depth: 15.00 - 18.16m  
Core Box No.: 2



15.00 - 18.16m





# BOREHOLE LOG

**CLIENT:** University of New South Wales  
**PROJECT:** UNSW Wellness Precinct  
**LOCATION:** Physics Lawn, UNSW, Kensington

**SURFACE LEVEL:** 29.8 AHD  
**EASTING:** 336373.6  
**NORTHING:** 6245393.7  
**DIP/AZIMUTH:** 90°/--

**BORE No:** EH08  
**PROJECT No:** 86763.00  
**DATE:** 1-5-2019  
**SHEET 3 OF 3**

| RL | Depth (m) | Description of Strata      | Degree of Weathering |    |    |    |    | Graphic Log | Rock Strength |        |          |     |        | Water | Fracture Spacing (m) | Discontinuities |           | Sampling & In Situ Testing |      |      |      |      |      |             |           |           |             |
|----|-----------|----------------------------|----------------------|----|----|----|----|-------------|---------------|--------|----------|-----|--------|-------|----------------------|-----------------|-----------|----------------------------|------|------|------|------|------|-------------|-----------|-----------|-------------|
|    |           |                            | EW                   | HW | MW | SW | FS |             | FR            | Ex Low | Very Low | Low | Medium |       |                      | High            | Very High | Ex High                    | 0.01 | 0.05 | 0.10 | 0.50 | 1.00 | B - Bedding | J - Joint | S - Shear | F - Fault   |
|    | 20.4      | Bore discontinued at 20.4m |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      | C           | 100       | 100       | PL(A) = 1.2 |
|    | 21        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 22        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 23        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 24        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 25        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 26        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 27        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 28        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |
|    | 29        |                            |                      |    |    |    |    |             |               |        |          |     |        |       |                      |                 |           |                            |      |      |      |      |      |             |           |           |             |

**RIG:** Explora 140      **DRILLER:** JS      **LOGGED:** SK      **CASING:** HW to 6.4m  
**TYPE OF BORING:** SFA (TC bit) To 4m; R to 6.4m; NMLC coring to 20.4m  
**WATER OBSERVATIONS:** No free groundwater observed whilst augering  
**REMARKS:** Well installed - screened from 4.5m-20.0m; BD01/010519 taken at 0.9-1.0m; 100% water loss from ~11.3m

| SAMPLING & IN SITU TESTING LEGEND |                      |       |  |
|-----------------------------------|----------------------|-------|--|
| A                                 | Auger sample         | G     | Gas sample                             |
| B                                 | Bulk sample          | P     | Piston sample                          |
| BLK                               | Block sample         | U     | Tube sample (x mm dia.)                |
| C                                 | Core drilling        | W     | Water sample                           |
| D                                 | Disturbed sample     | >     | Water seep                             |
| E                                 | Environmental sample | ≡     | Water level                            |
|                                   |                      | PID   | Photo ionisation detector (ppm)        |
|                                   |                      | PL(A) | Point load axial test Is(50) (MPa)     |
|                                   |                      | PL(D) | Point load diametral test Is(50) (MPa) |
|                                   |                      | gp    | Pocket penetrometer (kPa)              |
|                                   |                      | S     | Standard penetration test              |
|                                   |                      | V     | Shear vane (kPa)                       |



BORE: EH08

PROJECT: UNSW (86763.00)

MAY 2019



Project No: 86763.00

BH ID: EH8

Depth: 6.40 - 11.00 m

Core Box No.: 1



6.40 - 11.00 m

BORE: EH08

PROJECT: UNSW (86763.00)

MAY 2019



Project No: 86763.00

BH ID: EH8

Depth: 11.00 - 16.00 m

Core Box No.: 2



11.00 - 16.00 m

**BORE: EH08**

**PROJECT: UNSW (86763.00)**

**MAY 2019**



Project No: 86763.00

BH ID: EH8

Depth: 16.00 - 20.40 m

Core Box No.: 3



**16.00 - 20.40m**

# WELL LOG

**CLIENT:** University of New South Wales  
**PROJECT:** UNSW Wellness Precinct  
**LOCATION:** Physics Lawn, UNSW, Kensington

**SURFACE LEVEL:** 27.8 AHD  
**EASTING:** 336286.8  
**NORTHING:** 6245399  
**DIP/AZIMUTH:** 90°/--

**BORE No:** EH05  
**PROJECT No:** 86763.00  
**DATE:** 30/4 - 1/5/2019  
**SHEET 1 OF 1**

| RL   | Depth (m) | Description of Strata  | Graphic Log | Sampling & In Situ Testing |       |        | Water        | Well Construction Details |
|------|-----------|--|-------------|----------------------------|-------|--------|--------------|---------------------------|
|      |           |  |             | Type                       | Depth | Sample |              |                           |
| 27.8 | 0.6       | FILLING: dark brown, silty sand filling with some clay trace gravel, roots in top 0.3m, dry to moist   |             | A                          | 0.0   |        |              | Plastic Irrigation Cover  |
|      |           |  |             | A                          | 0.1   |        |              | Sand Backfill             |
|      |           |  |             | A                          | 0.4   |        |              |                           |
|      |           |  |             | A                          | 0.5   |        |              |                           |
|      |           | SAND: loose to medium dense, dark grey-brown and pale brown, fine to medium sand, dry to moist (aeolian)   |             | A                          | 0.9   |        | 4.4,5        |                           |
|      |           |  |             | S                          | 1.0   |        | N = 9        |                           |
|      |           | 1.7m: pale grey  |             | A                          | 1.45  |        |              | Bentonite                 |
|      |           |  |             | A                          | 1.5   |        |              |                           |
|      |           | 2.2m: grey, grey-brown and brown   |             | A                          | 1.6   |        |              |                           |
|      |           |  |             | A                          | 1.9   |        |              |                           |
|      |           |  |             | A                          | 2.0   |        |              |                           |
|      |           |  |             | A                          | 2.4   |        |              |                           |
|      |           | 3.0m: orange-brown   |             | S                          | 2.5   |        | 8,8,9        |                           |
|      |           |  |             | S                          | 2.95  |        | N = 17       | Grout                     |
|      |           |  |             | A                          | 3.5   |        |              |                           |
|      |           |  |             | S                          | 4.0   |        | 4,5,4        |                           |
|      |           |  |             | S                          | 4.45  |        | N = 9        |                           |
|      |           |  |             | A                          | 4.5   |        |              | Bentonite                 |
|      |           | 5.0m: medium dense, yellow-grey  |             | A                          | 5.0   |        |              |                           |
|      |           |  |             | A                          | 5.5   |        | 5,9,13       |                           |
|      |           | 5.5m: moist to wet   |             | S                          | 5.95  |        | N = 22       |                           |
|      |           |  |             | S                          | 6.75  |        | 13,25,25     |                           |
|      |           | SAND: dense to very dense, pale grey brown, fine to medium grained sand, moist to wet (aeolian)  |             | S                          | 7.15  |        | N = 50       | Gravel                    |
|      |           |  |             | S                          | 8.25  |        | 20,25/100    | Screen                    |
|      |           | SANDSTONE: extremely to very low strength pale grey brown, fine to medium grained sandstone  |             | S                          | 8.5   |        | refusal      |                           |
|      |           |  |             | S                          | 9.7   |        | 25/130       |                           |
|      |           |  |             | S                          | 9.83  |        | refusal      | Bentonite                 |
|      |           |  |             | C                          | 10.9  |        | PL(A) = 0.52 |                           |
|      |           | SANDSTONE: medium strength, moderately weathered then fresh, slightly fractured, pale grey with some red iron staining, medium to coarse grained sandstone |             | C                          | 11.0  |        |              |                           |
|      |           |  |             | C                          | 12.15 |        | PL(A) = 0.67 |                           |
|      |           |  |             | C                          | 12.3  |        |              |                           |
|      |           |  |             | C                          | 13.1  |        | PL(A) = 0.56 |                           |
|      |           |  |             | C                          | 13.89 |        | PL(A) = 0.93 |                           |
|      |           | SANDSTONE: high strength, fresh, unbroken, pale grey, medium grained sandstone, with some carbonaceous flecks  |             | C                          | 14.2  |        |              | Grout                     |
|      |           |  |             | C                          | 15.1  |        | PL(A) = 1.4  |                           |
|      |           |  |             | C                          | 15.15 |        |              |                           |
|      |           |  |             | C                          | 16.25 |        | PL(A) = 1.2  |                           |
|      |           |  |             | C                          | 17.35 |        | PL(A) = 1.1  |                           |
|      |           |  |             | C                          | 18.0  |        | PL(A) = 1.3  |                           |
|      |           | Bore discontinued at 18.16m  |             |                            | 18.16 |        |              |                           |

**RIG:** Scout 1      **DRILLER:** SS      **LOGGED:** AH / SI      **CASING:** HW to 5.5m

**TYPE OF BORING:** SFA (TC bit) to 5.5m; R to 10.9m; NMLC coring to 18.16m

**WATER OBSERVATIONS:** No free groundwater observed whilst augering

**REMARKS:** Well installed - screened from 6.3m to 9.3m; BD03/01/0519 taken at 2.4-2.5m;

| SAMPLING & IN SITU TESTING LEGEND |                      |       |  |
|-----------------------------------|----------------------|-------|--|
| A                                 | Auger sample         | G     | Gas sample                             |
| B                                 | Bulk sample          | P     | Piston sample                          |
| BLK                               | Block sample         | U     | Tube sample (x mm dia.)                |
| C                                 | Core drilling        | W     | Water sample                           |
| D                                 | Disturbed sample     | >     | Water seep                             |
| E                                 | Environmental sample | ≡     | Water level                            |
|                                   |                      | PI(D) | Photo ionisation detector (ppm)        |
|                                   |                      | PL(A) | Point load axial test Is(50) (MPa)     |
|                                   |                      | PL(D) | Point load diametral test Is(50) (MPa) |
|                                   |                      | pp    | Pocket penetrometer (kPa)              |
|                                   |                      | S     | Standard penetration test              |
|                                   |                      | V     | Shear vane (kPa)                       |



# WELL LOG

**CLIENT:** University of New South Wales  
**PROJECT:** UNSW Wellness Precinct  
**LOCATION:** Physics Lawn, UNSW, Kensington

**SURFACE LEVEL:** 29.8 AHD  
**EASTING:** 336373.6  
**NORTHING:** 6245393.7  
**DIP/AZIMUTH:** 90°/--

**BORE No:** EH08  
**PROJECT No:** 86763.00  
**DATE:** 1-5-2019  
**SHEET 1 OF 1**

| RL   | Depth (m)    | Description of Strata  | Graphic Log | Sampling & In Situ Testing |       |        | Water             | Well Construction Details                              |
|------|--------------|--|-------------|----------------------------|-------|--------|-------------------|--|
|      |              |  |             | Type                       | Depth | Sample |                   |  |
| 29.8 | 0.3          | FILLING: dark brown, fine silty sand filling, trace roadbase gravel, roots in top 0.1m, dry to moist                               |             | A                          | 0.1   |        |                   | Plastic Irrigation Cover<br>Sand Backfill<br>Bentonite |
|      | 0.7          |  |             | A                          | 0.2   |        |                   |  |
|      | 1.0          |  |             | A                          | 0.4   |        |                   |  |
|      | 1.0          | FILLING: medium dense, pink-grey, fine to medium silty sand trace sandstone and roadbase gravel, dry to moist                      |             | A                          | 0.5   |        | 7,7,5<br>N = 12   | 1  |
|      | 1.5          |  |             | S                          | 0.9   |        |                   |  |
|      | 2.0          | SAND: medium dense, pale grey, fine to medium sand, moist (aeolian)<br>1.5m: orange yellow<br>2.0m: pale grey and yellow           |             | A                          | 1.45  |        |                   | Grout  |
|      | 2.5          |  |             | S                          | 1.5   |        |                   |  |
|      | 3.0          |  |             | A                          | 2.0   |        | 3,3,3<br>N = 6    |  |
|      | 4.0          |  |             | S                          | 2.5   |        |                   | Bentonite  |
|      | 4.45         |  |             | A                          | 2.95  |        | 6,9,13<br>N = 22  |  |
|      | 5.0          | SAND: dense, pale grey brown, fine to medium sand with some clay (alluvium/aeolian)  |             | S                          | 4.0   |        |                   |  |
|      | 5.2          |  |             |                            | 4.45  |        | 9,16,22<br>N = 38 |  |
|      | 5.65         |  |             |                            | 5.0   |        |                   |  |
|      | 6.4          | SANDSTONE: medium strength, moderately to slightly weathered, slightly fractured, pale grey orange-brown, medium grained sandstone |             | C                          | 6.4   |        | PL(A) = 0.52      |  |
|      | 6.5          |  |             |                            | 6.5   |        | PL(A) = 0.5       |  |
|      | 8.32         | SANDSTONE: medium to high strength, fresh, slightly fractured, pale grey, medium to coarse grained sandstone                       |             | C                          | 7.5   |        | PL(A) = 0.5       |  |
|      | 8.35         |  |             |                            | 8.35  |        | PL(A) = 0.48      |  |
|      | 8.45         |  |             |                            | 8.45  |        | PL(A) = 2.2       |  |
|      | 10.22-10.35m | some siltstone quartz  |             | C                          | 9.8   |        | PL(A) = 2.2       |  |
|      | 10.6         |  |             | C                          | 10.6  |        | PL(A) = 0.98      |  |
|      | 11.37        |  |             | C                          | 11.37 |        | PL(A) = 1         |  |
|      | 11.8         | SANDSTONE: low strength, fresh, fractured, pale grey and grey, medium to coarse grained sandstone with some siltstone bands        |             | C                          | 11.55 |        | PL(A) = 1         | 12<br>Gravel Screen                                    |
|      | 12.03        |  |             |                            | 12.1  |        | PL(A) = 0.21      |  |
|      | 12.4         | SANDSTONE: medium strength, fresh, slightly fractured to fractured, pale grey-grey, medium to coarse grained sandstone             |             | C                          | 12.7  |        | PL(A) = 0.91      |  |
|      | 13.55        |  |             |                            | 13.55 |        | PL(A) = 0.77      |  |
|      | 14.39        |  |             |                            | 14.39 |        | PL(A) = 0.92      |  |
|      | 15.13        | SANDSTONE: high strength, fresh, slightly fractured and unbroken, grey, medium to coarse grained sandstone                         |             | C                          | 14.8  |        | PL(A) = 0.92      |  |
|      | 15.5         |  |             |                            | 15.5  |        | PL(A) = 1.2       |  |
|      | 16.5         |  |             |                            | 16.5  |        | PL(A) = 1.5       |  |
|      | 17.41        |  |             |                            | 17.41 |        | PL(A) = 1.8       |  |
|      | 17.6         |  |             | C                          | 17.6  |        | PL(A) = 1.8       |  |
|      | 18.25        |  |             |                            | 18.25 |        | PL(A) = 1.5       |  |
|      | 19.25        |  |             |                            | 19.25 |        | PL(A) = 1.3       |  |
|      | 20.1         | Bore discontinued at 20.4m   |             | C                          | 20.1  |        | PL(A) = 1.2       | 20<br>Bentonite  |
|      | 20.4         |  |             |                            | 20.4  |        |                   |  |

**RIG:** Explora 140      **DRILLER:** JS      **LOGGED:** SK      **CASING:** HW to 6.4m  
**TYPE OF BORING:** SFA (TC bit) To 4m; R to 6.4m; NMLC coring to 20.4m  
**WATER OBSERVATIONS:** No free groundwater observed whilst augering  
**REMARKS:** Well installed - screened from 4.5m-20.0m; BD01/010519 taken at 0.9-1.0m; 100% water loss from ~11.3m

|     |                      |   |                         |       |  |
|-----|----------------------|---|-------------------------|-------|--|
| A   | Auger sample         | G | Gas sample              | PLD   | Photo ionisation detector (ppm)        |
| B   | Bulk sample          | P | Piston sample           | PL(A) | Point load axial test Is(50) (MPa)     |
| BLK | Block sample         | U | Tube sample (x mm dia.) | PL(D) | Point load diametral test Is(50) (MPa) |
| C   | Core drilling        | W | Water sample            | pp    | Pocket penetrometer (kPa)              |
| D   | Disturbed sample     | > | Water seep              | S     | Standard penetration test              |
| E   | Environmental sample | ≡ | Water level             | V     | Shear vane (kPa)                       |

