Douglas PARTNERS

GROUNDED EXPERTISE

Groundwater Impact Assessment

Proposed Mixed-Use Residential Redevelopment

88 Waterloo Road, Macquarie Park NSW

Prepared for Cottonwood Development Pty Ltd

Project 222462.01

21 January 2026

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Document History

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

Signature	Date
Author	21 January 2026
Reviewer	21 January 2026

Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

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Planning Summary

The following summary has been prepared at the request of the planning consultant.

This Groundwater Impact Assessment has been prepared by Douglas Partners Pty Ltd to accompany a State Significant Development Application (**SSDA**) and concurrent Rezoning Proposal – SSD-94006708 for a mixed-use development identified at 15-21 Cottonwood Crescent, Macquarie Park (the site).

The proposal includes provision for the demolition of existing buildings and construction of a residential development comprising two residential flat buildings above a common basement car park and podium. The legal description of the site is outlined below.

Property Address	Title Description
15 Cottonwood Crescent, Macquarie Park	SP8144
17 Cottonwood Crescent, Macquarie Park	SP7630
19 Cottonwood Crescent, Macquarie Park	SP7892
21 Cottonwood Crescent, Macquarie Park	SP7984

For the purposes of this report, the site is also referred to as '**88 Waterloo Road, Macquarie Park**'.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (**SEARs**) issued for the project (SSD-94006708).

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 October 2025 and issued for the SSDA (SSD-94006708). Specifically, this report has been prepared to respond to the SEARs requirement below.

Item	Description of Requirement
12 – Ground and Groundwater Conditions	• 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.

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1. Introduction

1.1 Purpose of this report

This report presents the results of a groundwater impact assessment (GIA) undertaken for a proposed mixed-use development at 88 Waterloo Road, Macquarie Park NSW (currently 15-21 Cottonwood Crescent). Preparation of this report was commissioned by Cottonwood Development Pty Ltd.

It is understood that the proposed development of the site includes demolition of the existing residential flat buildings on the site and construction of two mixed-use residential towers with a joint six level basement.

The purpose of this GIA is to accompany a State Significant Development Application (SSDA) and concurrent Rezoning Proposal – SSD-94006708. Additionally, this document aims to assist in obtaining the necessary approvals for the disposal of extracted groundwater, where applicable.

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

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

- Geotechnical investigation (Douglas, 2024a);
- Groundwater monitoring (Douglas, 2024b);
- Preliminary dewatering management plan (Douglas, 2024c);
- Preliminary and Detailed Site Investigation (JBS&G, 2024); and
- Supplementary Geotechnical Investigation (Douglas, 2025).

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

- The proposed works will intercept the groundwater table;
- Groundwater levels on site have been observed up to RL 35.9 (m AHD);
- The lowest level of the proposed basement is approximately RL 24;
- The basement is intended to be drained;
- The proposed method of dewatering is a sump-and-pump system; and
- The extracted groundwater is intended to be disposed of via stormwater.

This GIA is intended as a preliminary document and will be superseded by a detailed DMP that includes water treatment and discharge schematics, monitoring plans, and triggers to be implemented during construction.

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

1.2 Regulatory framework and guidance

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

- *Guidelines for Groundwater Protection in Australia*, National Water Quality Management Strategy (Australian Government, 2013);
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018);
- Minimum requirements for building site groundwater investigations and reporting (NSW DPE, 2022);
- *NSW Aquifer Interference Policy* (DPI-NSW Office of Water, 2012);
- *NSW Aquifer Interference Policy* (NSW DPI, 2013), supplementary version;
- Groundwater assessment toolbox for Major Projects in NSW (NSW DPE, 2022);
- Guidelines for Groundwater Documentation for SSD/SSI Projects (NSW DPE, 2022);
- Minimum Groundwater Modelling Requirements for SSD/SSI Projects (NSW DPE, 2022); and
- Cumulative Groundwater Impact Assessment Approaches (NSW DPE, 2022).

Additional regulatory requirements may also apply, including WaterNSW approvals for water take and disposal (see Section 9), *Water Management (General) Regulation 2025* (NSW Government, 2025) and local council or EPA conditions depending on the nature and location of discharge.

2. Proposed development

The proposed development is understood to include:

- Demolition of the existing residential apartment buildings on the site;
- Bulk excavation across about two thirds of the site, to levels of approximately RL 24 to form the proposed six level basement (with localised excavations expected to be deeper, i.e. lift pit overruns);
- Construction of two mixed-use residential towers of up to 60 storeys, with a joint podium.

The proposed basement excavation will involve excavation to maximum depths of up to approximately 26 m below existing site levels, decreasing to approximately 20 m towards the northeast.

Excavation is proposed within approximately 20-30 m of existing Sydney Metro tunnels below Waterloo Road.

3. Site description

The site is located at 15-21 Cottonwood Crescent, Macquarie Park (SP8144, SP7630, SP7892, SP7984) within the Ryde Local Government Area (LGA). It is a rectangular shaped area with plan dimensions of approximately 100 m by 45 m and an area of 4500 m^2. Across the four lots, the site surface elevation ranges from RL 50 to RL 43.

The site is bounded by:

- Cottonwood Crescent, then three storey residential buildings (apparently of brick construction) to the southeast;
- Waterloo Road, then Macquarie Shopping Centre, to the northeast;
- A public park (Elouera Reserve) to the northwest; and
- Residential three to four storey residential buildings (apparently of brick construction) to the southwest.

The site is currently occupied by four 4-storey unit buildings with on-grade parking and driveways located around each building. The unit buildings are also surrounded by multiple large trees and garden beds.

Broadly around the site, surface elevations generally fall towards the east (towards Shrimptons Creek). Sydney Metro tunnels run parallel to and below Waterloo Road, to the northeast of the site. The tunnels are (horizontally) very close to the northeast site boundary, with the first and second reserves intersecting the site as shown approximately on Figure 1. It is understood that the tunnels are approximately 7 m diameter, and the tunnel centreline elevations are in the order of RL 29 (adjacent to the site).

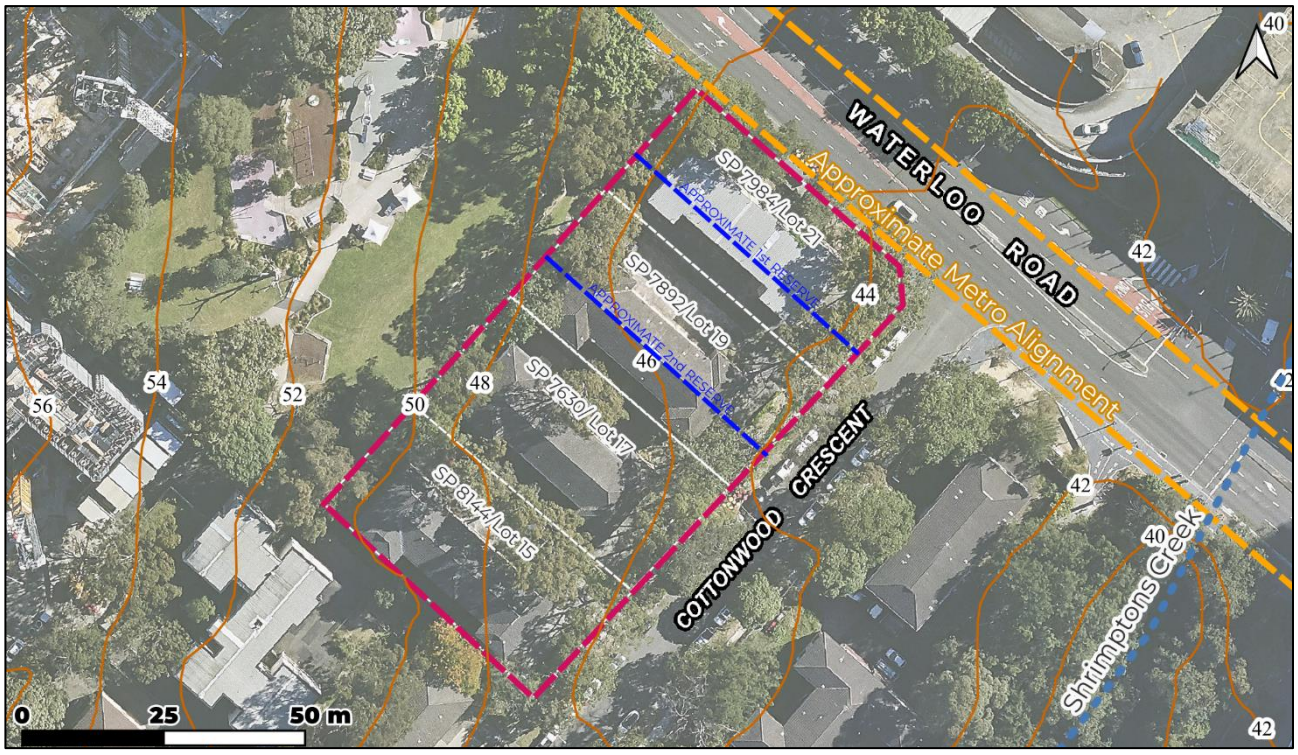

Figure 1: Aerial image of the site showing approximate site boundary and lots, with 2 m AHD contours overlain. Sydney Metro reserve zones shown in blue.

4. Hydrogeological setting

4.1 Topography and hydrology

The regional topography slopes north east, with a steep drop off past the M2 motorway into the Lane Cove River valley. Shrimptons Creek, a tributary of the Lane Cove River, is located approximately 60 m south east of the site.

4.2 Climate

The average annual rainfall in Sydney is 1200 mm, in a temperate climate with warm summers, mild winters and no dry seasons.

4.3 Geology

With reference to the Sydney 1:100 000 Series Geological Sheet indicates that the site is underlain by Hawkesbury Sandstone which typically comprises medium to coarse grained quartz sandstone with some shale bands or lenses. The results of the site investigations confirmed the regional mapping with sandstone bedrock intersected at shallow depth.

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

4.4 Hydrogeology and groundwater source

Based on the hydrogeological setting, the site is assumed to underlain by an unconfined aquifer hosted by the Hawkesbury Sandstone bedrock, predominantly in structures where secondary permeability has been enhanced (i.e. in fractures and cracks).

Reference to the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (DPE Water, 2023) indicates that the site is underlain by the Sydney Basin Central Groundwater Source (i.e. the underlying sandstone bedrock), considered a porous rock groundwater source.

4.5 Groundwater receptors

A search of the BoM national groundwater information system (NGIS) shows there are three registered groundwater bores within 500 m of the site (Figure 2). The three bores are all registered for monitoring purposes. No groundwater measurement records are available for the bores. There are no registered extraction bores within 500 m of the site.

A review of the Bureau of Meteorology (BoM)'s groundwater dependent ecosystems (GDE) atlas indicates that there are no mapped GDEs within 500 m of the site. The closest GDEs are approximately 600-700 m away, both up-gradient within Shrimptons Creek, and down-gradient within the Lane Cover River National Park (Figure 2).

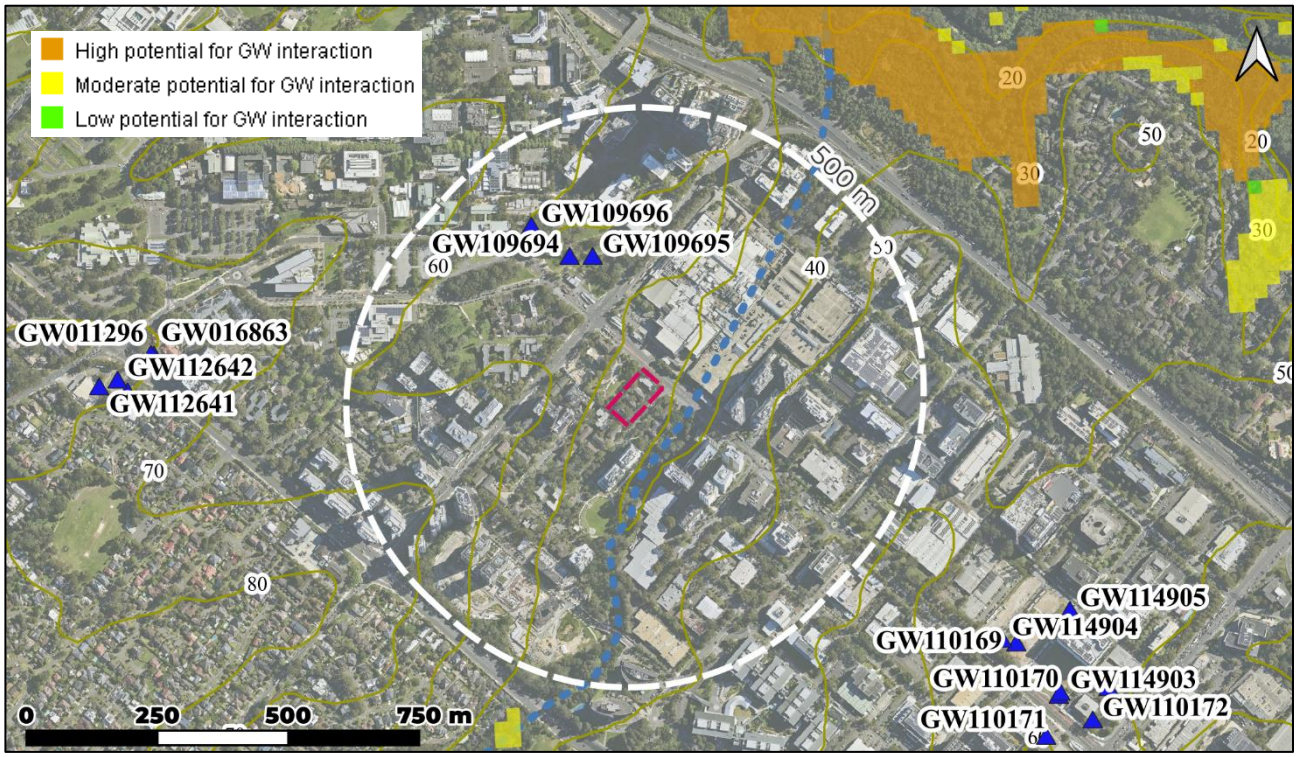

Figure 2: Groundwater receptors, with 10 m AHD contours overlain

4.6 Acid sulfate soils and salinity

Reference to the 1:25,000 Acid Sulfate Soils (ASS) Risk map indicates that the site is in an area of no known occurrence of ASS. The nearest mapped occurrence of ASS is bottom sediments of the Lane Cove River about 2.5 km to the east of the site.

Reference to the NSW Salinity Risk mapping indicates that the site is not located within an area that is considered likely to have salinity issues.

5. Investigation results

5.1 Geotechnical

Previous geotechnical investigations have been conducted on site, including in 2018, 2024 and October 2025 (refer to Douglas report 222462.01.R.007.Rev0 (2025)) for more information.

The field work for the investigation drilling completed in 2024 and 2025 included:

- Drilling of ten (10) boreholes (BH1 to BH7 and BH101 to BH103) using a tracked, truck mounted or bobcat mounted drilling rig;
- The boreholes were drilled into weathered rock at depths of between 0.6 m and 1.7 m using a combination of diatube coring, continuous solid flight augers and rotary wash bore methods and then continued to depths of between 14.2 m and 45.2 m using NMLC or HQ diamond core drilling methods to obtain continuous core samples of the bedrock;
- Packer tests within BH101 to BH103 at selected intervals in the rock to assess the permeability of the rock mass. Packer testing involves inflating a rubber bladder to seal off a section of the borehole and pumping water through to the sealed section at set pressures while monitoring the volume of water lost to assess the rock mass permeability in sections of the borehole; and
- Installation of seven (7) groundwater monitoring wells in BH1, BH2, BH5, BH6, BH101, BH102 and BH103 to allow for the measurement of groundwater levels, which were developed (purged) following installation.

The test locations and geotechnical cross sections are shown in Appendix A. The detailed bore logs and rock core photographs are included in Appendix C, together with notes defining classifications methods and descriptive terms.

The interpreted geotechnical model is summarised as follows:

- **FILL**: typically comprising concrete pavement and/or uncontrolled sand or clay fill with varying proportions of silt, gravel, organic matter and building rubble to shallow depths of up to 0.85 m; overlying,
- **RESIDUAL SOILS AND EXTREMELY WEATHERED SANDSTONE**: typically comprising sand, clayey sand and extremely weathered sandstone to depths of up to 1.7 m; overlying,
- **SANDSTONE BEDROCK**: initially very low, low, or medium strength, highly weathered Hawkesbury Sandstone encountered at depths between 0.2 m (underneath the pavement) and 1.7 m, generally becoming high strength and generally less weathered with depth.

The sandstone bedrock was typically slightly fractured to unbroken, with discrete zones of fractured rock. Occasional steeply dipping (75-90°) to moderately dipping (45-60°) joints were observed within the sandstone bedrock, within both the weathered and fresh rock.

5.2 Groundwater

Table 1 summarises the monitoring wells' attributes. All wells were screened within the sandstone bedrock. The location of each monitoring well is shown on Drawing 1 (Appendix A).

Table 1: Monitoring well details

Well ID	Installation date	Surface (m AHD)	Screened interval	
			m bgl	RL (m AHD)
BH1	30/01/2024	48.1	1.5 – 17.2	46.6 – 30.9
BH2	31/01/2024	48.5	2.0 – 17.0	46.5 – 31.5
BH5	02/02/2024	43.6	5.0 – 18.5	38.6 - 25.1
BH6	02/02/2024	45.6	2.5 – 14.2	43.1 – 31.4
BH2-2018	2018 (historic)	44.7	Unknown (bottom depth 15 m bgl)	
BH101	02/06/2025	44.7	32.6 – 42.1	12.1 – 2.6
BH102	11/04/2025	46.3	34.5 – 44.0	11.8 – 2.3
BH103	09/04/2025	47.4	35.7 – 45.2	11.7 – 2.2

Notes to table:
m bgl metres below ground level

Groundwater was not observed during auger drilling at any location. The use of drilling fluid during rock coring precluded any further groundwater observations during drilling.

Groundwater monitoring was previously conducted by Douglas in four wells from June to September 2024. A second stage of groundwater monitoring is currently ongoing, since 20 October 2025. Hydrographs showing recorded levels in comparison with rainfall data over time are presented in Appendix D.

Maximum, minimum and average groundwater levels recorded by the dataloggers are presented in Table 2. Note that the monitoring results from 2024 (BH1, BH2, BH5, BH6 and BH2-2018 only) are presented separately to the first month of more recent monitoring results.

Comparison of level data between the 2024 and 2025 periods indicates generally similar results, with groundwater levels remaining steady and showing little response to rainfall.

The water level observed in BH2-2018 was consistently near the base of the standpipe during the monitoring period and may be associated with a small volume of water trapped in the bottom of the standpipe. It is potentially not representative of an actual groundwater level, which may be below the standpipe in this location. The significant variation in observed groundwater level in BH5 is discussed in Section 6.

Table 2: Summary of groundwater monitoring results

Well ID	Depth to GWL (m bgl)			GWL elevation (m AHD)			Range (m)
	Lowest	Highest	Average	Min.	Max.	Average	
BH1	12.7	12.2	12.5	35.4	35.9	35.6	0.5
BH2	13.2	12.9	13	35.3	35.6	35.5	0.3
BH5	16.9	9.5	11.8	26.7	34.1	31.8	7.4
BH6	11.2	10.8	11.0	34.4	34.8	34.6	0.4
BH2-2018	14.9	14.5	14.7	29.8	30.2	30.0	0.4
BH101	11.6	11.4	11.5	33.1	33.3	33.2	0.2
BH102	13.2	13.0	13.1	33.1	33.3	33.2	0.2
BH103	13.8	13.6	13.7	33.6	33.8	33.7	0.2

Notes to table:
m bgl metres below ground level

5.3 Hydraulic conductivity

5.3.1 Rising head testing

Rising head hydraulic conductivity tests were carried out at the monitoring wells in May 2024 and October 2025. The tests were undertaken by removing a volume of water from the monitoring wells to lower the water level and measurement of the subsequent recovery rate to piezometric level.

Hydraulic conductivity tests were analysed using the Hvorslev (1951) solution for slug testing interpretation. Results are presented in Table 3. The detailed results of the tests are attached in Appendix E.

Table 3: Interpreted hydraulic conductivity results

Well ID	Test date	Screened depth (m bgl)	Hydraulic conductivity, K	
			(m/s)	m/day
BH1	27/05/2024	1.5 – 17.2	3.9×10^{-8}	0.004
BH2	27/05/2024	2.0 – 17.0	3.4×10^{-8}	0.003
BH5	27/05/2024	5.0 – 18.5	1.8×10^{-8}	0.002
BH6	27/05/2024	2.5 – 14.2	3.6×10^{-8}	0.003
BH101	27/10/2025	32.6 – 42.1	2.9×10^{-8}	0.003
BH102	27/10/2025	34.5 – 44.0	1.6×10^{-8}	0.002
BH103	27/10/2025	35.7 – 45.2	5.3×10^{-8}	0.005
		Geometric mean	**3.0×10^{-8}**	**0.003**

5.3.2 Packer permeability testing

The results of the packer tests completed during drilling are summarised in Table 4. All tests were completed within the sandstone bedrock.

Table 4: Summary of Packer Test Results

Borehole	Date of Test	Depth Interval (m)	Houlsby Lugeon Value	Interpreted hydraulic conductivity (m/s)
BH101	02/06/2025	12.0 - 18.0	20	2×10^{-6}
BH101	02/06/2025	24.0 - 30.0	< 0.1	1×10^{-8}
BH101	03/06/2025	30.0 - 36.1	0.7	7×10^{-8}
BH101	04/06/2025	36.0 - 42.1	0.1	1×10^{-8}
BH102	14/04/2025	13.0 - 19.0	0.2	2×10^{-8}
BH102	15/04/2025	21.0 - 27.0	0.2	2×10^{-8}
BH102	15/04/2025	33.0 - 39.0	0.2	2×10^{-8}
BH102	16/04/2025	38.0 - 44.0	0.2	2×10^{-8}
BH103	09/04/2025	14.0 - 20.2	0.3	3×10^{-8}
BH103	09/04/2025	21.2 - 27.2	1	1×10^{-7}
BH103	10/04/2025	33.2 - 39.2	0.3	3×10^{-8}
BH103	10/04/2025	39.2 - 45.2	0.1	1×10^{-8}
			Geometric mean	**2.7×10^{-8}**

5.4 Groundwater quality

5.4.1 Preliminary site investigation (contamination) (PSI) / detailed site investigation (contamination) (DSI) (JBS&G, 2024)

JBS&G have undertaken a combined PSI/DSI for the proposed development in 2024. The combined PSI/DSI included a desktop review, preliminary conceptual site model (CSM), drilling of 14 boreholes and testing of selected soil samples for the identified contaminants of potential concern (COPC). The PSI/DSI did not include sampling or laboratory analysis of groundwater.

JBS&G identified the COPC potentially relevant to groundwater to be metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP) and polychlorinated biphenyl (PCB).

JBS&G concluded that the potential for migration of contaminants from the site via groundwater was low based on the results of soil testing.

5.4.2 Dewatering management plan (DMP) (Douglas, 2024c)

Douglas prepared a dewatering management plan (DMP) for the proposed development in 2024. The DMP reported on groundwater sampling of three groundwater monitoring wells (BH1, BH2 and BH5) for the COPC identified within the PSI/DSI (JBS&G, 2024). Details regarding the sampling is provided in the previous report and summarised in Section 5.4.4.

5.4.3 Additional groundwater testing

Douglas has undertaken an additional round of groundwater testing for the purposes of establishing ambient groundwater conditions, and to inform potential requirements for treatment. Groundwater sampling was undertaken by Douglas and comprised sampling of three monitoring wells (BH101, BH102, BH103)

Groundwater sampling was carried out in accordance with Douglas' standard operating procedures. Groundwater samples were collected using a positive displacement low flow bladder pump via the micro-purge (minimal drawdown) method. The method minimises aeration of the sample and disturbance to the water column thereby enhancing the quality of results for oxygen sensitive analytes. The sampling method is described as follows:

- Measure the static water level using an electronic interface probe and record the thickness of LNAPL (if encountered);
- Decontaminate the interface probe and cable between monitoring wells by rinsing in a diluted Decon-90 / Liquinox solution and then rinsing in demineralised water;
- Fit the pump with a well-dedicated bladder and tubing. Lower the pump into the well then clamp at a level estimated to be 1 m below the top of the water column (provided the depth of the pump is within the screened section) or to the approximate mid-point of the well screen;
- Set the pump at the lowest rate possible that could produce laminar flow to minimise drawdown of the water column;
- Measure physical parameters by continuously passing the purged water through a flow cell; and
- Following stabilisation of the field parameters, collect samples in laboratory-prepared bottles minimising headspace within the sample bottle and cap immediately.

Groundwater samples were dispatched to a National Association of Testing Authorities (NATA) accredited laboratory for the analysis of dissolved metals, TRH, BTEXN, PAH, OCP, organophosphorus pesticides (OPP), PCB, total dissolved solids (TDS), phenols and major ions. Field and despatch chain of custody (COC), laboratory sample receipt advice (SRA) and laboratory report sheets are provided in Appendix F.

5.4.4 Results

Groundwater quality field results are summarised as follows (based on 2024 sampling event (Douglas, 2024c):

- Groundwater beneath the site is fresh (i.e. <0.8 mS/cm);
- Groundwater is slightly acidic (i.e. pH from 4.9 to 6.2);

- Reducing (oxidation reduction potential (ORP)<0) conditions at BH1 and oxidising conditions at BH2 and BH5 (ORP>0);
- No non-aqueous phase liquids or oily sheens were recorded.

A summary of laboratory results compared to adopted discharge criteria (refer to Section 9.4.1) is provided in Appendix F. The results of groundwater testing to date indicate the following:

- BTEXN, phenols, PCB, OCP and OPP below adopted practical quantitation limits (PQL);
- Field pH and field dissolved oxygen (DO) exceeding ANZECC (2000);
- Metals (copper, iron, nickel and zinc) exceeding ANZG (2018) at most samples tested; and
- Elevated total recoverable hydrocarbons (TRH) results in most of the samples tested.

Note some of the adopted discharge criteria were the same or lower than the laboratory practical quantitation limit (PQL) for some sub-analytes of PAH, OCP, OPP and PCB. The risk of these contaminants is considered to be low based on the findings of the PSI/DSI.

The elevated metal concentrations in groundwater are likely attributable to urban background levels given the location of the site. Metals were detected both up and down gradient of the site and did not appear to be significantly affected by the site.

No high reliability guidelines are available for petroleum hydrocarbons, and the laboratory PQL is therefore adopted as a screening criterion for TRH for discharge. TRH concentrations above PQL were detected in most groundwater samples (except for BH5) with concentrations of TRH generally >C10. C6 – C10 (F1) was detected at one location (BH102) which is indicative of volatile TRH in the sample tested. Laboratory chromatograms were interpreted by Envirolab suggested no strong correlation to the reference library, however, may indicate organic material or oil.

In summary, it is expected that as a minimum treatment will be required prior to discharge for metals, TRH and pH. Treatment to reduce turbidity is also commonly required for dewatering. It is considered that treatment requirements for groundwater and any additional stormwater runoff can be achieved through conventional methods by the dewatering contractor. Groundwater disposal options and management requirements are further discussed in Section 9.

6. Conceptual hydrogeological model

Based on the 2024 and 2025 investigation results, the site groundwater table is within fresh, slightly fractured to unbroken sandstone. Inflows into the proposed drained basement are expected to be associated with subsurface flows within the low permeability rock aquifer, and ephemeral seepage along the top of rock following rainfall events.

Observations to date indicate that groundwater levels across of the site have been consistent throughout the 2024 and 2025 periods of monitoring, with fluctuations of generally less than 0.5 m. Groundwater elevations have been measured to slope between RL 36 in the southwest of the site and RL 33 in the northeast of the site. In the larger regional system, the groundwater flows off site are expected to ultimately flow into the Lane Cove River to the northeast.

The exception to this trend was observed in BH5, where an on average 6 m drop in level was observed between 2024 and 2025. Similarly lowered groundwater levels were not observed in BH101 (to-date), which is approximately 20 m from BH5. The lowered groundwater level observed in BH5 is interpreted to be associated with basement constructions ongoing to the northwest of the site. The behaviour of groundwater in rock mass is controlled primarily by flow through fractures (bedding, joints, etc.) in the rock mass. Whether these fractures form pathways establishing connectivity between monitoring wells and dewatering sites nearby is a major factor affecting the time lag between dewatering nearby commencing and being able to observe the resulting drawdown in monitoring wells.

It is expected that the proposed basement excavation (to approximately RL 24) will intercept the observed groundwater table by about 10 to 12 m.

The existing Sydney Metro tunnels to the northeast of the site, and the Macquarie University station box approximately 100 m to the north / northwest of the site, are understood to be of permanently drained construction, with rail levels in the order of RL 26.5 to 26.9. It is likely that the existing observed groundwater levels are affected by dewatering of the tunnels and station box. Note that the tunnels and station box were built approximately 15 years ago and any impacts to perennial groundwater levels associated with their ongoing dewatering are expected to have reached a steady-state condition.

Shrimptons Creek, approximately 70 m to the southeast of the subject site, is at a higher elevation (approximately between RL 40 and RL 38) than the observed groundwater levels on the subject site (below than RL 36). It is expected that most of the flow in Shrimptons Creek runs off to the Lane Cove River, and the contribution of the creek to recharge of the unconfined aquifer at the subject site is minimal. This is evidenced given the exposed rock surface conditions and low permeability of the sandstone rock mass.

It should be noted that groundwater levels are transient and fluctuate with climatic variations and other factors (e.g. adjacent excavations, pumping). Therefore, the water levels will temporarily rise during periods of heavy or prolonged rainfall and fall during dry periods. Groundwater levels can also be affected by the amount of pumping occurring in groundwater extraction bores in the aquifer.

Figure 3: View of Shrimptons Creek looking south

7. Groundwater inflow assessment

7.1 Numerical modelling methodology

Seepage modelling was undertaken to assess the potential inflow rates into the proposed excavation during and after construction, as well as induced groundwater level changes in adjacent and surrounding areas.

A 3-dimensional (3D) numerical groundwater model was developed. The modelling was carried out using the Visual MODFLOW (VMOD) software engines (McDonald & Harbaugh, 1988). VMOD is a three-dimensional numerical groundwater modelling tool and is accepted as an industry-standard code for groundwater flow and contaminant transport. The model was developed using the pre-processor or 3D visualisation technology graphical interface program Visual MODFLOW Flex V9.0 by Waterloo Hydrogeologic. The model was based on site-specific data where possible, as well as estimates of unknown parameters based on experience in similar environments, values from literature (Fetter, 2001) and data matching.

7.1.1 Numerical model geometry and layers

The subsurface profile was simulated as a single sandstone unit, comprised of 10 sub-layers. Adopted hydraulic properties (base case) are presented in Table 5. Parameters were selected based on the results of the hydraulic conductivity testing (Section 5.3), ranges of values documented in the available literature for similar lithologies (e.g. Fetter 1994 and Hoek & Bray 1981) and previous experience with similar materials.

Table 5: Model layer summary (base case)

Model Zone	No. sub-layers	Model Base	Represented Material	S_y	S_s (m^{-1})	K_h (m/s)	K_v/K_h
1	10	0 m AHD	Sandstone	0.1	$1.0x10^{-3}$	$3x10^{-8}$	0.3

Notes: 1. Based on geotechnical investigations (ranging from 11.9 to 19.6 m AHD across the site)
2. Hydraulic conductivities taken as geometric mean for each unit group from rising head and packer testing
Sy: Specific yield; **Ss**: Specific Storage; **Kh**: Horizontal hydraulic conductivity; **Kv**: Vertical hydraulic conductivity

7.1.2 Boundary conditions

The following boundary conditions were assigned to the model:

- The model edges were simulated as no flow boundaries and were selected to follow local ridge lines where possible. The model extent is shown in Drawing 7, Appendix A;
- A constant head boundary condition of RL 20 was used at the northern edge of model, to simulate the Lane Cove River Valley;
- A recharge boundary condition was assigned to the top of Layer 1 to represent rainfall infiltration. As the site land use is urban, rainfall recharge to the groundwater table is predicted to be low. A recharge value of 1% (i.e. about 10 mm/yr) was obtained during numerical calibration of the 'pre-development' model; and
- Shrimptons Creek was simulated as a drain boundary condition as groundwater is likely to discharge into the creek.

Recharge could also possibly be occurring from anthropogenic sources, such as seepage from leaking water mains. Loss of water from the aquifer may be occurring due to extraction activities from nearby drained infrastructure (eg. Metro Station and tunnels). Water loss from the aquifer to the atmosphere through evapotranspiration (e.g. from vegetation at the surface, above the aquifer) is considered and combined with the effective recharge value adopted.

7.1.3 Drain cells

The MODFLOW 'drain package' can be used to simulate water loss from the groundwater system, and was assigned to the following model elements:

- Shrimptons Creek, set to a conductance of 200 m^2/day, and an elevation interpolated from RL 46 to 36;
- The metro rail corridor, set to a conductance of 200 m^2/day, and a uniform elevation of RL 26.5; and,
- The proposed basement area, simulating dewatering operations. The drain cells, set to a sufficiently high conductance of 3,500 m^2/day, represented the sub-floor drainage and sumps/pumps located within the excavation, to simulate dewatering of the site during construction at RL 24.

7.2 Model calibration

The initial model (i.e. pre-development) was calibrated to match the observed maximum groundwater levels in the monitoring wells to date (Table 9). These calibrated values were applied to the model as the initial hydraulic head. This calibration confirmed that the bedrock parameters chosen for the model appeared to be representative of site conditions. The calibrated initial (existing) groundwater levels and model calibration output are illustrated on Drawing 3 in Appendix A.

Table 6: Baseline model calibration

Borehole	Maximum observed GWL (m AHD)	Modelled initial hydraulic head (m AHD)	Difference (m)
BH1	35.9	38.8	2.9
BH2	35.6	37.4	1.8
BH5	34.1	32.3	-1.8
BH6	34.8	35.2	0.4
BH101	33.3	32.7	-0.6
BH102	33.3	35.1	1.8
BH103	33.8	36.8	3
Average residual			1.1

7.3 Sensitivity scenarios

Sensitivity analyses were run to assess groundwater inflows under higher hydraulic conductivity and higher groundwater level conditions:

- Sensitivity 1: Hydraulic conductivity of the underlying sandstone increased by an order of magnitude, i.e. $K_h = 3.0 \times 10^{-7}$ m/s;
- Sensitivity 2: Groundwater levels modelled 2 m higher than the baseline calibrated level.

7.4 Groundwater modelling results

7.4.1 Predicted groundwater inflow

The model assumes excavation and dewatering to target depth is instantaneous, resulting in substantial predicted inflows during the first day of construction. In reality, the dewatering level will gradually deepen as the excavation progresses, at which time a (lower) steady-state inflow would be expected. The estimated inflows from the analysis for the first year (i.e. during construction) and long term are summarised in:

- Table 7, for the base case scenarios as detailed in previous sections; and
- Table 8, for the sensitivity analysis.

Note that the precision to which the results are presented is to allow comparisons of scenarios and does not represent the accuracy of the inflow estimates.

Table 7: Base case - predictive Model of Simulated Groundwater Inflow Rates with time

Elapsed Time (days)	Dewatering Inflow Rate		
	kL/day	L/min	Cumulative Inflow (ML)
14	23.7	16.4	0.3
31	9.9	6.9	0.5
51	8.6	6.0	0.7
75	7.7	5.4	0.9
105	7.1	4.9	1.1
140	6.6	4.6	1.3
182	6.2	4.3	1.6
232	5.9	4.1	1.9
292	5.6	3.9	2.2
365	5.3	3.7	2.6
Steady-state	**3.4**	**6.4**	**1.2**

Table 8: Simulated Long Term Inflow Results for Sensitivity Cases

Long term inflow	Sensitivity 1 – higher K		Sensitivity 2 – higher GWL	
	kL/day	ML/year	kL/day	ML/year
	31.7	11.6	4.1	1.5

Notes: K: hydraulic conductivity; GWL: groundwater level

The results of the sensitivity cases for groundwater inflow analysis indicate that:

- Inflow increases will be minor in the event of heavy rain and elevated groundwater levels; and
- Inflows are sensitive to the hydraulic conductivity of the bedrock. If the hydraulic conductivity is one order of magnitude higher than measured, inflows would also be 10 times higher. If encountered, grouting of high permeability zones is recommended.

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

7.4.2 Predicted groundwater drawdown

The drawdown contours are produced by subtracting the predicted water levels from the initial calibrated groundwater levels. The predicted long-term drawdown following the completion of the modelled 'drained' basement is illustrated in Drawing 3 in Appendix A (under base case conditions). The model results indicate that the 1 and 2 m predicted drawdown contours may extend up to 300 m and 150 m from the site boundaries, respectively.

8. Impact assessment

8.1 Aquifer Interference Policy consideration

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

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

- Less than or equal to 10% cumulative variation in water table 40 m from any high priority GDE or high priority culturally significant site;
- A cumulative pressure head decline of no more than a 2 m at any water supply work; and
- Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

8.2 Environmental risk assessment

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

Table 9: Assessment of Potential Effects of Dewatering

Item	Comment
Impacts on potential GDEs	There are no potential GDEs mapped within 500 m of the site. Impacts are therefore considered unlikely. Shrimptons Creek is not considered to be a GDE within the vicinity of the site, as discussed in Section 6. The proposed excavation and dewatering are predicted to have a negligible effect on creek bed losses.
Water supply losses by neighbouring groundwater users	A review of registered bores within a 500 m radius to the surrounding site was undertaken. The search identified no extraction bores within the 500 m radius (Section 4.5). Water supply losses by other groundwater users are therefore considered unlikely.

Item	Comment
Potential subsidence of neighbouring structures	Groundwater drawdown is predicted to occur within the sandstone bedrock with high deformation moduli. Risk of subsidence due to lowering of the water table is considered to be minimal.
Mounding of water upgradient of structure	As the basement is proposed to be drained, mounding of groundwater is not expected upgradient of the site.
Potentially contaminated groundwater	Results of testing suggest elevated metals and TRH within groundwater tested. Groundwater will require treatment prior to discharge.
ASS and salinity	Acid sulfate and salinity risks at the site are considered low. Furthermore, groundwater on the site is within the rock profile, and as such, the drawdown in groundwater levels should not result in any potential ASS oxidising or salinity issues on site.

9. Recommended management strategy

9.1 General

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

Dewatering is proposed to be undertaken using sumps and pumps. The preferred method for groundwater disposal is discharge to the stormwater system.

Appropriate management measures will be required during both construction and operation to ensure that groundwater inflows and associated impacts from dewatering remain within expected limits. This DMP addresses construction-phase dewatering only. A separate long-term, post-construction DMP will need to be developed and implemented to manage groundwater inflows during the operational phase of the basement.

9.2 Groundwater inflow control

9.2.1 Control measures and monitoring

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

Groundwater inflow control measures may include:

- Perimeter drainage to capture and divert groundwater;
- Inflow reduction measures such as grouting.

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

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

More information on recommended monitoring is provided in Section 9.5.

9.2.2 Trigger levels

Control measures will be monitored against two key thresholds:

- Volume trigger: inflow exceeds 3 ML over a 1-year period (Section 7.4.1); or
- Drawdown trigger: groundwater drawdown is not considered to be a significant risk at the site, therefore a groundwater level trigger is considered unnecessary, subject to approval by DCCEEW.

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

9.3 Discharge options and contingency measures

Management options for groundwater disposal are presented in Table 10.

Based on the predicted dewatering rates, Option 1 (disposal to stormwater) is considered feasible. The other two options listed in Table 10 are provided as contingency plans.

Table 10: Summary of possible management options

Management Option	Comments
Option 1: On-site treatment (if required) and disposal to stormwater.	Generally applicable where the treatment required is routine, e.g. solids removal, alum dosing and pH adjustment. Treatment of specific contaminants may require more physical space and result in higher treatment costs. Water disposed to stormwater is typically required to meet general NSW DPE requirements (NSW DPE 2021 & 2022), ANZG (2018) water quality standards for the relevant receiving water body and any associated uses. Further requirements may be enforced depending on the specific approval documentation.
Option 2: * Disposal to the sewer under a Trade Waste Agreement with Sydney Water.	Generally, will require further negotiation and establishment of water quality criteria prior to disposal. Water quality screening levels will depend on the specific trade waste agreement with Sydney Water.
Option 3: ** Tanker off-site for disposal at a licensed	May be suitable for more heavily contaminated liquids where on-site treatment is not practicable. Appropriate as a contingency strategy.

Management Option	Comments
liquid waste treatment facility.	Is limited in applicability for larger volumes of water. Water quality screening levels will depend on specific requirements of the waste facility (including their Environmental Protection Licence conditions)

Notes to table:

* Sydney Water has a general policy of only issuing a trade waste agreement for disposal of water from excavations where all other options have been exhausted.

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

9.4 Water quality control

The preferred disposal option is discharge to the stormwater system, subject to approval from relevant authorities, and appropriate testing and treatment as described in subsequent sections.

Based on the available laboratory results, some form of treatment of groundwater will be required prior to discharge.

9.4.1 Discharge criteria

The recommended discharge criteria are based on the stormwater system discharging to a freshwater body, and comprise guideline levels from:

- ANZG, 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018' (ANZG, 2018), with a 95% level of protection (LOP) for freshwater ecosystems (or 99% LOP where recommended by ANZG, 2018 for slightly to moderately disturbed systems); and
- ANZECC. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australia and New Zealand Environment and Conservation Council, for lowland rivers in South-east Australia for pH (Table 3.3.2) and turbidity (Table 3.3.3) in the absence of ANZG (2018) DGV.

No high reliability guidelines are available for petroleum hydrocarbons, and the laboratory PQL is therefore to be adopted as a screening criteria for TRH for discharge. Results recorded above the PQL will require further assessment to assess the suitability of the impacted water for discharge.

The discharge criteria are subject to the approval of the Council or other consent authority responsible for the receiving water body and stormwater network.

9.4.2 Treatment options

It is expected that as a minimum treatment will be required prior to discharge for metals, TRH and pH. Treatment to reduce turbidity is also commonly required for dewatering.

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

- Sediment control: Settling tanks or flocculation to reduce turbidity and suspended solids.

- pH adjustment: Dosing with lime or acid to achieve acceptable discharge pH.
- Metals removal: Filtration or chemical precipitation, if metal concentrations exceed guidelines following flocculation.
- Hydrocarbon removal: Use of oil-water separators and / or activated carbon filters.

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

9.4.3 Proposed water quality monitoring

Water quality monitoring will be conducted in three phases, as follows:

- Baseline monitoring (completed): conducted prior to commencement of dewatering to inform treatment requirement and disposal options;
- Treatment trial monitoring: conducted at the start up period of dewatering to assess the success of the treatment equipment prior to discharge; and
- Routine monitoring: conducted throughout the dewatering and discharge period.

The requirements for each phase are provided below.

- Sampling is to be conducted by a suitably qualified environmental consultant. Water quality sampling should be conducted in accordance with the relevant guidelines;
- All field testing is to be conducted using calibrated water quality meters. All laboratory analysis is to be conducted at a National Association of Testing Authorities (NATA) accredited laboratory; and
- Quality assurance / quality control (QA/QC) procedures should be used to establish accurate, reliable and precise results. QA/QC procedures should include calibration of equipment, analyses of samples within holding times, keeping samples chilled and wearing gloves during sampling.

9.4.3.1 Treatment trial monitoring

The purpose of the treatment trial and associated monitoring is to assess the success of the treatment method in treating water to meet the discharge criteria, or any modifications required to treat the water to meet the discharge criteria.

The treatment trial may operate using a batch or continuous treatment. For a batch treatment approach, the treated water can be disposed of to stormwater following confirmation it meets the discharge criteria, subject to Council approval. For a continuous treatment approach the treated water cannot be disposed of to stormwater until the treatment trial has been successfully completed. The treated groundwater may be stored on site, or disposed of via an alternative method (e.g. to a licensed liquid waste facility).

For batch based treatment, sampling events can be conducted for each batch, with a maximum of one batch of water treated a day. For continuous treatment, testing should occur every one to three days.

The treatment trial monitoring is to include testing for the analytes listed in Section 9.4.3.3. The treatment trial is to continue until three sequential samples of treated water meet the discharge criteria.

Sampling and analysis of three samples of untreated water (over three sampling events) for all analytes in Section 9.4.3.3 is also to be conducted, either as part of the treatment trial (if suitable water available for sampling), or otherwise in the initial stage of the routine testing.

9.4.3.2 Routine monitoring

The purpose of the routine monitoring is to assess ongoing compliance with the discharge criteria. Changes in the water quality post treatment may occur due to changes in the extracted water quality or changes during treatment (e.g. filters nearing end of life).

The base requirements for routine monitoring are provided in Section 9.5. The sampling frequency and analytical suite should be reviewed by the Environmental Consultant during the dewatering period. Based on this review the Environmental Consultant may recommend:

- Removing some analytes, due to sufficient data being available to assess that they are not of concern;
- A reduction in the frequency of analysis of some analytes, due to sufficient data being available to show consistency in water quality;
- Analysis of additional analytes, or more frequent analysis of some or all analytes, due to variability in the results or additional risks being identified based on field observations of laboratory results.

Recommendations for reductions in the analytical programme should be approved by relevant authorities prior to being implemented.

9.4.3.3 Analytes

The testing suite has been adopted based on the following information:

- Requirements of DPE (2021);
- Contaminants of potential concern relative to groundwater identified in the PSI/DSI (JBS&G);
- Baseline water quality data;
- Potential for spills / leaks during excavation works; and
- General parameters to inform suitability of the water for discharge and changes in groundwater source.

Table 11: Proposed suite of analytes for water quality monitoring

Category	Analytes	Minimum frequency
Field parameters	pH, visible / olfactory signs of turbidity, oil / grease, chemical / noxious odours	Treatment trial [1] Daily

Category	Analytes	Minimum frequency
	EC, REDOX potential (Eh), temperature, dissolved oxygen, turbidity	Treatment trial [1] Monthly [1]
Physical parameters	Alkalinity (total, carbonate, hydroxide bicarbonate), TDS, total hardness, TSS, total organic carbon (TOC), sodium absorption ratio (SAR)	Treatment trial [1] Monthly [1]
Major ions	Sulfate (SO4), chloride (Cl), carbonates (CO3), bromide (Br), fluoride (F), Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K) Cation/anion balance (as a percentage)	Treatment trial [1] Monthly [1]
Metals (total)	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), mercury (Hg), nickel (Ni), zinc (Zn)	Treatment trial [2] Every routine sampling event [2]
Nutrients	Ammonia (NH3), nitrate (NO3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P), reactive phosphorus (P)	Treatment trial Routine sampling events if required based on treatment trial [2]
Potential contaminants	TRH (or TPH), BTEX, naphthalene,	Treatment trial [2] Every routine sampling event [2]
Potential contaminants	VOC	Treatment trial [2] Routine sampling events if required based on treatment trial [2]

Notes:
2 Sampling requirements and frequencies may be reviewed as discussed in Section 9.4.3.2
Acronyms EC: electrical conductivity | TDS: total dissolved solids | TSS: total suspended solids
TRH: total recoverable hydrocarbons | TPH: total petroleum hydrocarbons
BTEX: benzene, toluene, ethylbenzene and xylenes
PAH: polycyclic aromatic hydrocarbons
OCP: organochlorine pesticides
OPP: organophosphate pesticides
PCB: polychlorinated biphenyls
VOC: volatile organic compounds

9.5 Monitoring and reporting requirements (during construction)

The following monitoring program and associated reporting is to be adopted until the end of excavation and construction works on-site. Groundwater level monitoring should be continued one month after construction. Groundwater level monitoring should be undertaken in a minimum of three monitoring wells. It is recommended that the existing monitoring wells used for the groundwater investigation be used during and after construction. Any wells damaged during construction should be replaced in a timely manner.

A separate DMP should then be implemented post-construction.

Table 12: Monitoring and reporting requirements

Item	Monitoring requirements	Methodology
Visual inspection	No visible oil and grease, sheen, significant discolouration or odours.	Daily inspections (by contractor). **HOLD POINT -** If indicators are observed, discharge must be suspended pending analytical confirmation.
Field parameter assessment	pH, daily, preferably continuously Visible / olfactory signs of turbidity, oil / grease, chemical / noxious odours: daily	• Measure with field pH meter of treated water. • Daily observations (by contractor).
Groundwater level monitoring	Given the small footprint of the site, installation of groundwater monitoring wells outside the basement footprint is considered impractical. In addition, predicted groundwater drawdown and associated impacts are assessed to be minor. Groundwater level monitoring is therefore not considered necessary, subject to approval by DCCEEW.	
Water quality sampling and testing	Samples from treated water to assess compliance with discharge criteria (Appendix G). As per analytical requirements in Section 9.4.3.3. Samples from untreated water as required to inform treatment requirements	All monitoring: • Sampling by suitably experienced environmental engineer / scientist. • Field parameters (pH, EC, turbidity) using field probes. • Chain of Custody (COC) documentation to accompany all samples. • Analysis by a NATA-accredited laboratory. Baseline and treatment trial: • As per Section 9.4.3. Routine: • Sampling pre-discharge (batch discharge): twice weekly for the first month, weekly for

Item	Monitoring requirements	Methodology
		the next five months, then every two weeks thereafter. • Intervals to be reviewed by Environmental Consultant, and may need to be increased in event of exceedance of discharge criteria. • Review and update frequency in accordance with Section 9.4.3.3. **HOLD POINT -** If water exceeds discharge criteria, manage as per contingency strategy (Section 9.7).
Quality control sampling	Replicate sampling to verify lab result accuracy.	• Conducted during above sampling events. • Analyse at a rate of 10% of samples. • Testing suite: Metals, TRH, BTEX and naphthalene. • Results to be included in final dewatering completion report.
Quantity of groundwater inflows	Measurements of groundwater volumes (as per Section 9.2).	• Weekly monitoring and reporting of groundwater abstraction volumes. • Results to be included in final dewatering completion report. **HOLD POINT -** If volumes exceed trigger levels or Council discharge allowance, works must be halted to minimise inflow (e.g. via grouting).
Dewatering completion report	Final documentation of the dewatering program.	Prepared by a suitably qualified consultant and to include: • Summary of contractor records (e.g. visual inspections, unexpected finds) • Full analytical and quality control results. • Records of dewatering volumes. • Commentary on compliance and any non-conformances with the DMP.

9.6 Personnel and responsibilities

Table 13 below outlines the proposed project personnel and relevant responsibilities as part of the management plan.

Table 13: Personnel and Responsibilities

Role	Responsibilities
Site Manager / Contractor	Routine visual inspection. Monitoring / recording of dewatering / discharge volumes.

Role	Responsibilities
	Maintaining any unexpected / contingency records.
Dewatering Contractor	Design / specification and ongoing maintenance of the dewatering system.
Geotechnical Consultant	Groundwater level monitoring and review of disposal volumes. Assist in preparation of the dewatering completion report.
Environmental Consultant	Water quality sampling (analysis using NATA accredited laboratories). Interim advice for each sampling event to confirm (or otherwise) compliance with discharge criteria. Quality control sampling. Assist in preparation of the dewatering completion report.

9.7 Contingency plan

As per Section 9.5, at any hold point if any non-conformance is encountered then the following general contingency plan will be enacted:

- Entity recording the non-conformance to notify the Site Manager / Contractor and other relevant parties;
- Dewatering volumes:
  - Should dewatering volumes be higher than predicted or higher than discharge limits provided by relevant authorities, suspend construction and reduce pumping rates. Options could include grouting to reduce groundwater inflows;
  - Suspend discharge;
- Water quality discharge criteria non-conformance:
  - Review of results by Environmental Consultant to assess potential risk to environment;
  - Should water quality be deemed unsuitable for disposal to stormwater, suspend discharge (and dewatering if required) and (further) treat water prior to discharge;
  - If relevant, Environmental Consultant to inspect the site / unexpected finds and collect additional water quality samples to assess issue of concern;
  - Review treatment procedures and update methodology as required to improve treatment outcomes;
  - Written advice by the Environmental Consultant that additional laboratory analytical results meet the discharge criteria and / or that recommending that continued discharge is not considered to pose an unacceptable environmental risk and / or recommending additional work (as applicable);
  - Off-site tankering may be adopted to meet disposal requirements; and
- Notification to relevant regulatory authorities, as required under approvals.

10. Approvals and licensing

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

10.1 Water Access Licence (WAL) and entitlements

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

The applicable water source for this project is the Sydney Basin Groundwater Source, which is managed under the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023*.

Groundwater modelling undertaken for the project predicts that groundwater inflow rates will be low, with an estimated inflow of approximately 1.2 ML/year under baseline conditions. Sensitivity (conservative) scenarios indicate that inflows could increase to up to approximately 12 ML/year if hydraulic conductivity is one order of magnitude higher than measured.

These predictions are estimates based on the information currently available; actual inflow rates may vary and will only be confirmed once excavation is complete and inflows can be directly measured.

As the conservative sensitivity case indicates potential inflows exceeding the 3 ML/year threshold, it is recommended that a Water Access Licence (WAL) be obtained with 12 unit shares, as a conservative measure.

10.2 Water Supply Works Approval (WSWA)

As the project is a SSD, a separate water supply works approvals for construction and long term dewatering are not required.

10.3 Council and EPA approvals

Depending on the proposed discharge route and water quality:

- Discharge to stormwater: Council approval may be required. Acceptance criteria typically align with ANZG guidelines and site-specific conditions – refer to Section 9.4.1.
- Discharge to sewer: A trade waste agreement may be required from the relevant water utility – refer to Section 9.3.
- Discharge off-site: A licensed contractor must be engaged, and records of transport and disposal must be maintained – refer to Section 9.3.

11. Conclusion

The previous geotechnical investigations identified that the site is generally underlain by shallow sand or clay fill and residual soil, overlying sandstone bedrock. The bedrock has low hydraulic conductivities. Groundwater levels were steady throughout the 2024 and 2025 monitoring periods, ranging between RL 27 and RL 36.

Regional groundwater flow is to the northeast, toward the Lane Cove River. Localised drawdown observed in one bore is interpreted to be related to nearby basement construction and existing drained tunnel rather than site conditions.

The proposed drained basement excavation (bulk excavations to about RL 24) is expected to intercept the groundwater table approximately 10 m to 12 m below current ground surface (RL 30 to 36) with inflows limited to low-permeability rock seepage and short-lived post-rainfall seepage.

Numerical groundwater modelling undertaken for the project predicts low baseline inflow rates of approximately 1.2 ML/year. Conservative sensitivity analyses indicate that inflows could increase to up to approximately 12 ML/year if hydraulic conductivity is one order of magnitude higher than measured. These predictions are estimates based on the information currently available; actual inflow rates may vary and will only be confirmed once excavation is complete and inflows can be directly measured.

As the conservative sensitivity case indicates potential inflows exceeding the 3 ML/year threshold, it is recommended that a WAL be obtained with 12 unit shares (i.e. 12 ML/year), as a precautionary and conservative measure.

Based on the assessment presented in this DMP, the proposed dewatering is not expected to result in significant adverse impacts to surrounding groundwater users, surface water features, or groundwater-dependent ecosystems, provided that dewatering is managed in accordance with this plan. A monitoring and management framework has been established to verify inflow rates during excavation and to allow adaptive management should conditions differ from those predicted.

Overall, the proposed drained basement and dewatering strategy are considered feasible and consistent with relevant regulatory requirements, subject to implementation of the mitigation, monitoring, and contingency measures outlined in this DMP.

11.1 Long-term Permanent Dewatering

Drainage measures within the basement walls and below the basement slab will be required to collect and store water inflows for periodic discharge in the long term.

A long-term management plan will also need to be incorporated into the final building management strategy, to ensure that appropriate monitoring and testing continues for the life of the building. This is expected to include regular (e.g., monthly) water quality measurement of limited parameters, and meter readings of discharge volumes, with reporting to Water NSW.

12. References

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

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

13. Limitations

Douglas Partners (Douglas) has prepared this report for this project at 88 Waterloo Road, Macquarie Park NSW in accordance with Douglas' proposal dated 14 March 2025 and acceptance received from Cottonwood Development Pty Ltd. The work was carried out under a mutual Consultancy Agreement. This report is provided for the exclusive use of Cottonwood Development Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

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

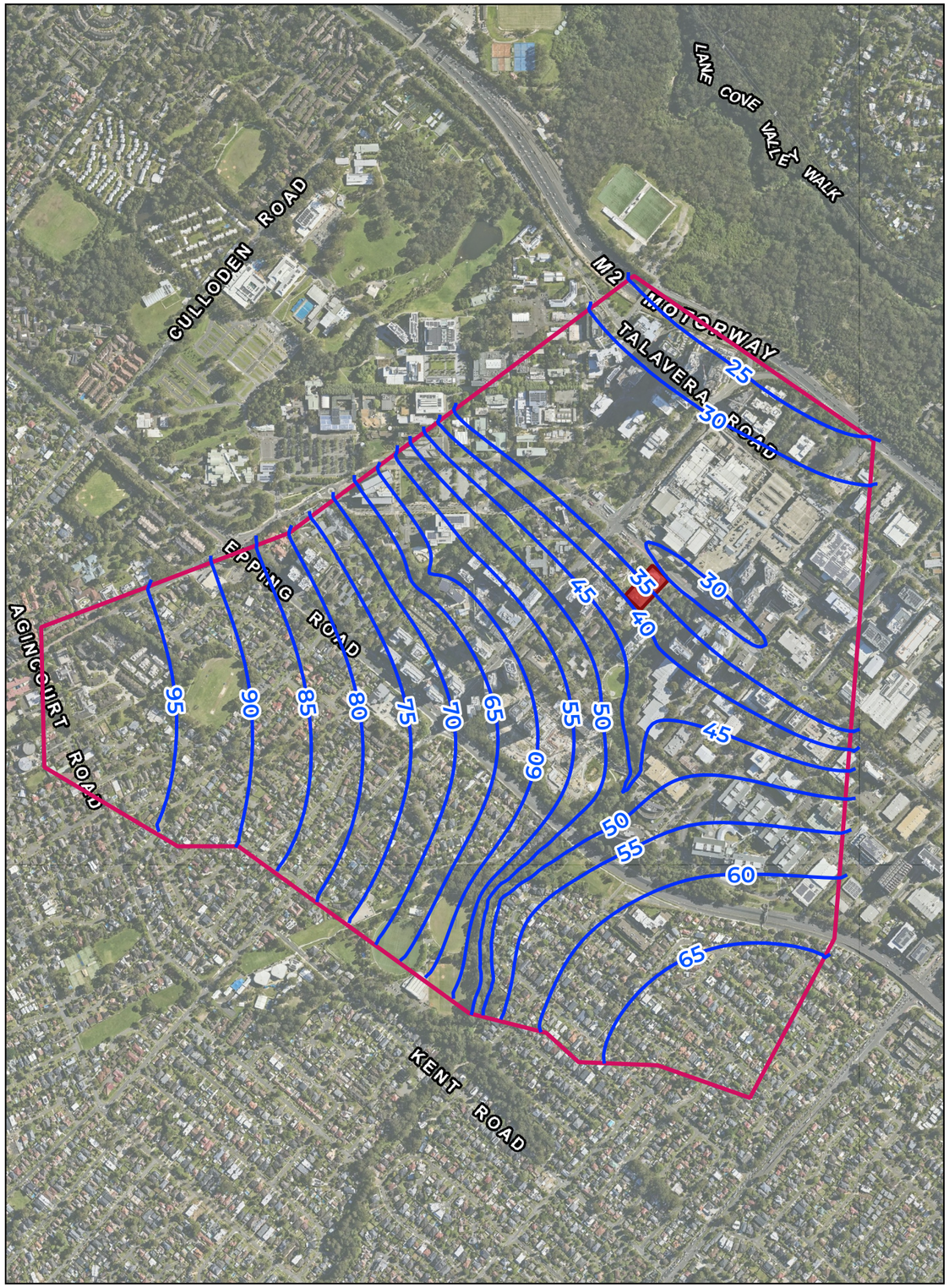
The assessment of atypical safety hazards arising from this advice is restricted to the groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed ‘safety in design’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

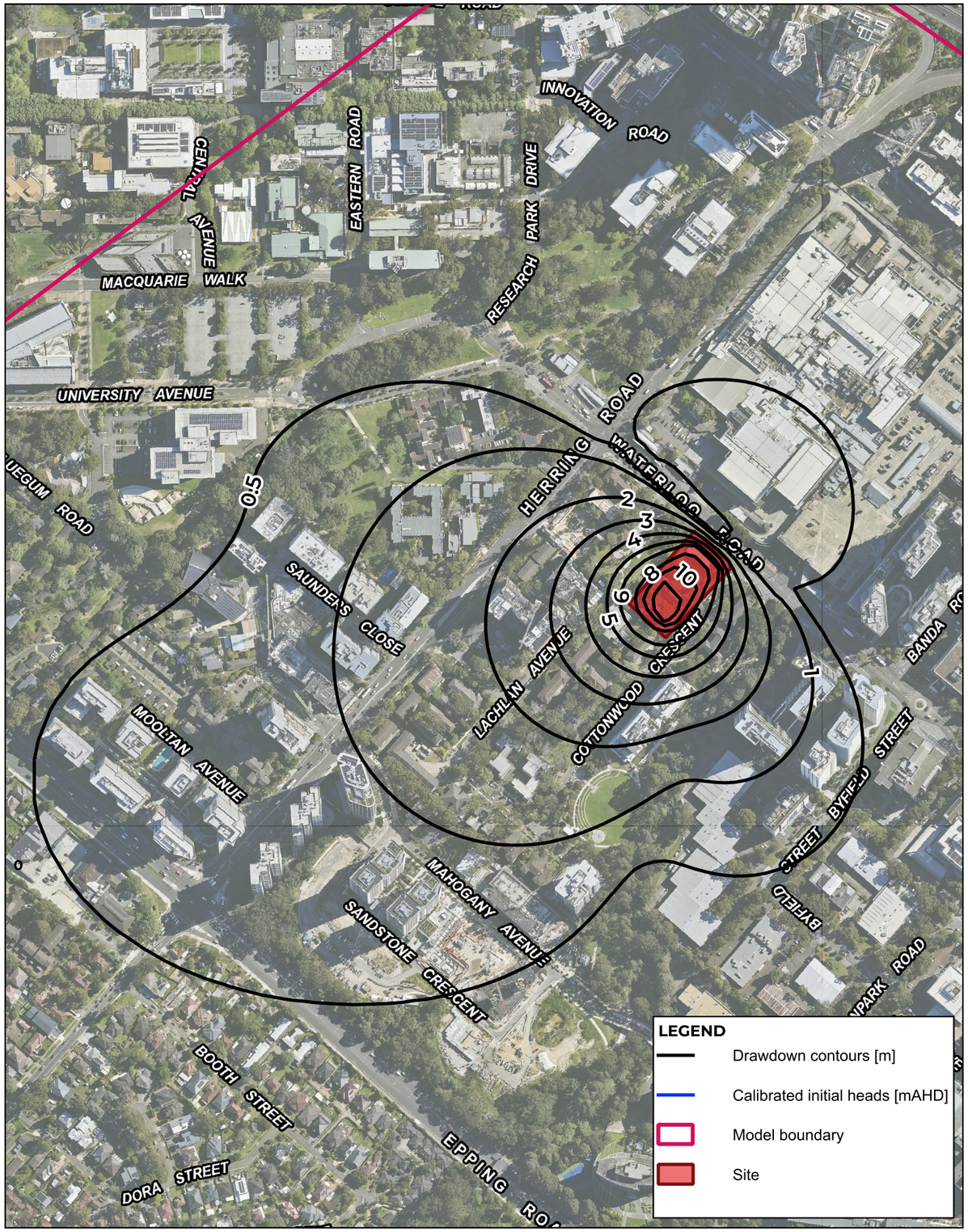
This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation,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

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

Appendix A

Drawings





REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Calibrated initial contours and drawdown	19.12.2025	JM

SCALE (righthand side): 0 50 100 150 200 250 m @ A3

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

CLIENT: **Legacy Property Pty Ltd**

NOTE:
1: Basemap from MetroMap WMS Services (AU Latest)
2: Contours exported from Modflow Model

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME: **Hydrogeological assessment**

PROJECT ADRESS: **15-20 Cottonwood Cres**

DRAWING TITLE: **CALIBRATED INITIAL HEADS & CALCULATED DRAWDOWN**

PROJECT NO: **222462.01**

DRAWING NO: **7**

REVISION: **0**

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
3	222462.01.D.001.Rev3	02.07.2025	RMM/SA

SCALE: 0 8 16 24 32 m
1:500 @A3

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

CLIENT:
Cottonwood Development Pty Ltd

NOTE:
1: Basemap from MetroMap (Dated 13.03.2025)
2: 1st and 2nd reserves lines from CMS Surveyours Pty Ltd, Drawing No.22451 detail, Issue 1 (Dated 06.11.2023)
3: Approximate Proposed Bulk Excavation Exent from AJC Architects, Project 23024, Sheet DA2001, Rev 1 (Dated 07.06.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Mixed-Use Residential Redevelopment

PROJECT ADRESS:
88 Waterloo Road, Macquarie Park

DRAWING TITLE:
Test Location Plan

PROJECT NO: **222462.01**
DRAWING NO: **1**
REVISION: **3**

A

A'

ELEVATION (AHD)

APPROXIMATE SITE BOUNDARY

APPROXIMATE 2no RESERVE

APPROXIMATE 1st RESERVE

APPROXIMATE SITE BOUNDARY

UNIT 1: FILL

UNIT 2: RESIDUAL SOIL & XW SANDSTONE

UNIT 3: L-M AND M STRENGTH SANDSTONE

UNIT 4: M-H AND H STRENGTH SANDSTONE

BH7

BH6

BH5

WATERLOO ROAD

APPROXIMATE LOCATION OF METRO TUNNELS

APPROXIMATE LOWEST PROPOSED EXCAVATION LEVEL RL 24.0 m AHD

DISTANCE ALONG PROFILE (m)

LEGEND

CONCRETE
SANDSTONE
Water Level
NO CORE
SC - Clayey SAND
FILL
SP - Poorly Graded SAND

TESTS / OTHER

— ? — — - Interpreted geotechnical boundary

ROCK STRENGTH

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

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	19.02.2024	EC
1	R.005 UPDATE	04.07.2025	EC
2	BEL UPDATE	17.11.2025	MN

SCALE: 0 5 10 15 20

1:500 @ A3
Vertical Exaggeration = 2.0

Douglas PARTNERS
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CLIENT:
Cottonwood Development Pty Ltd

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

PROJECT NAME:
Proposed Mixed-Use Residential Redevelopment

PROJECT ADDRESS:
88 Waterloo Road, Macquarie Park

DRAWING TITLE:
INTERPRETED GEOTECHNICAL CROSS SECTION A-A'

PROJECT No: **222462.01**

DRAWING No: **2**

REVISION: **2**

Appendix B

About this Report

About this Report

October 2024

Introduction

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

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

Copyright

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.

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Appendix C

Bore Logs

Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

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

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

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

Abbreviation Codes

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

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

Data Integrity Codes

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

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

Graphic Symbols

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

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

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

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

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

Particle size designation and Behaviour Model

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

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

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

[1] – refer grain size subdivision descriptions below

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

Component proportions

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

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

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

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

Classification

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

Soil Name

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

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

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

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

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

Identification of minor components

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

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

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

Soil Composition

Plasticity

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

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

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

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

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

Soil Condition

Moisture

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

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

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

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

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

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

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

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

Consistency (fine grained soils)

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

Relative Density (coarse grained soils)

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

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

Compaction (anthropogenically modified soil)

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

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

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

Soil Origin

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

Cobbles and Boulders

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

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

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Rock Strength

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

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

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

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

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

Degree of Alteration

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

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

Degree of Fracturing

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

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

Rock Quality Designation

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

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

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.

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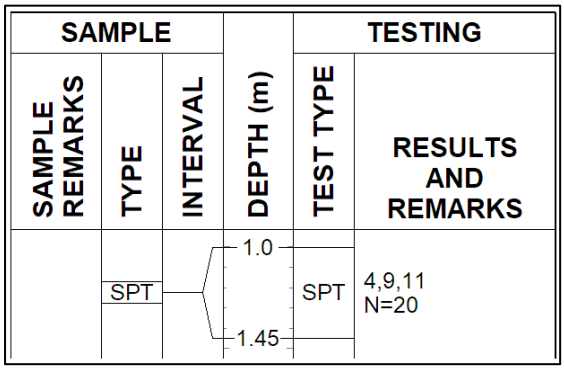
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

October 2024

Sampling and Testing

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



Sampling

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

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

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

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

Field and Laboratory Testing

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

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

Field and laboratory testing (continued)

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

Groundwater Observations

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

Drilling or Excavation Methods/Tools

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

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

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

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.1 AHD
COORDINATE: E:325791.8, N:6260745.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH1
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	48	0.15	FILL / Silty CLAY: dark brown; low to medium plasticity; trace rootlets; grass covered; topsoil.		FILL	NA	w>PL	Partial bulk sample 0-0.45	A		0.10			Bentonite	
		0.45	FILL / CLAY: orange-brown; medium to high plasticity; trace steel scrap. Slight paint odour.		FILL				A		0.30				
	47	1	Continued as rock								1				
	46	2									2				
	45	3									3				
	44	4									4				
	43	5									5				
	42	6									6				
	41	7									7				
	40	8									8				
	39	9									9			Gravel backfill	

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

PLANT: Bobcat
METHOD: HA to 0.45m, AD/T to 0.9m, NMLC to 17.22m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HWT to 0.8m

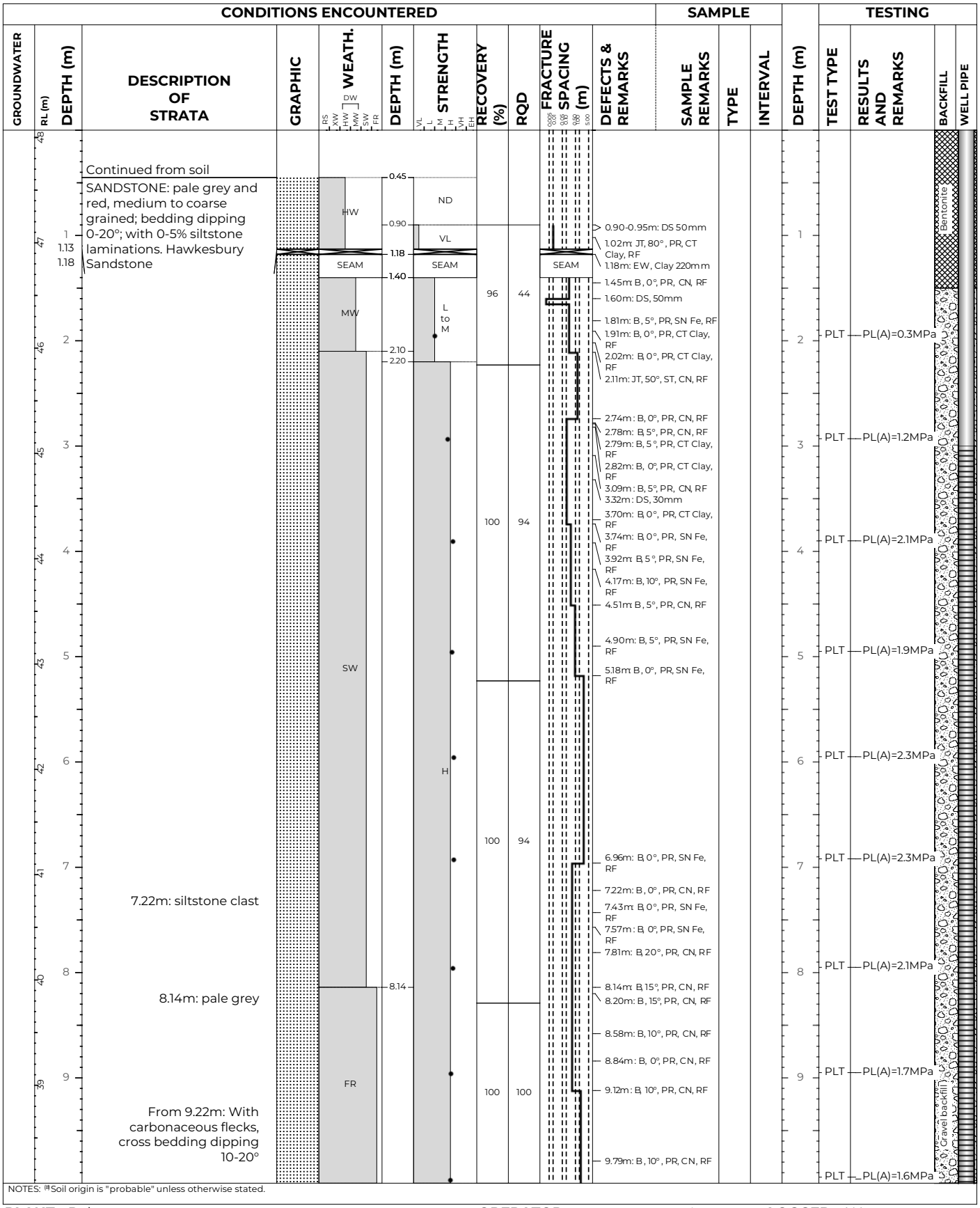
Generated with CORE-GS by Geroc - Split Soil-Rock Log

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.1 AHD
COORDINATE: E:325791.8, N:6260745.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH1
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 2 of 3



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

PLANT: Bobcat
METHOD: HA to 0.45m, AD/T to 0.9m, NMLC to 17.22m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HWT to 0.8m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.1 AHD
COORDINATE: E:325791.8, N:6260745.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH1
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	38	10.00	SANDSTONE: pale grey, medium to coarse grained; bedding dipping 0-20°; with 0-5% siltstone laminations. Hawkesbury Sandstone		FR		H	100	100		10.32m: B, 10°, PR, CBS, RF 10.55m: B, 0°, PR, CT Clay, RF				11	PLT	PL(A)=1.9MPa		
	37	11																	
15/02/24 08:29	36	12						100	100		12.66m: JT, 80°, PR, CN, RF 12.78m: B, 0°, PR, CN, RF				12	PLT	PL(A)=1.2MPa		
	35	13													13	PLT	PL(A)=1.4MPa		
	34	14									13.75m: B, 0°, PR, CT Clay, RF 13.96m: B, 15°, PR, CN, RF				14	PLT	PL(A)=2MPa		
	33	15									14.76m: B, 0°, PR, CN, RF				15	PLT	PL(A)=1.4MPa		
	32	16						100	97		15.58m: B, 0°, PR, CT Clay, RF 15.73m: B, 0°, PR, VNR Clay, RF				16	PLT	PL(A)=1.6MPa		
	31	17	Borehole discontinued at 17.22m depth. Target depth reached.								16.78m: B, 0°, PR, CN, RF 16.86m: B, 0°, PR, VNR Clay, RF				17	PLT PLT	PL(A)=1.1MPa PL(A)=1.6MPa		
	30	18													18				
	29	19													19				

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

PLANT: Bobcat
METHOD: HA to 0.45m, AD/T to 0.9m, NMLC to 17.22m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HWT to 0.8m

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 48.1 AHD
COORDINATE: E:325791.8, N:6260745.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 1 of 2

0.90-5.00 m depth

5.00-10.00 m depth

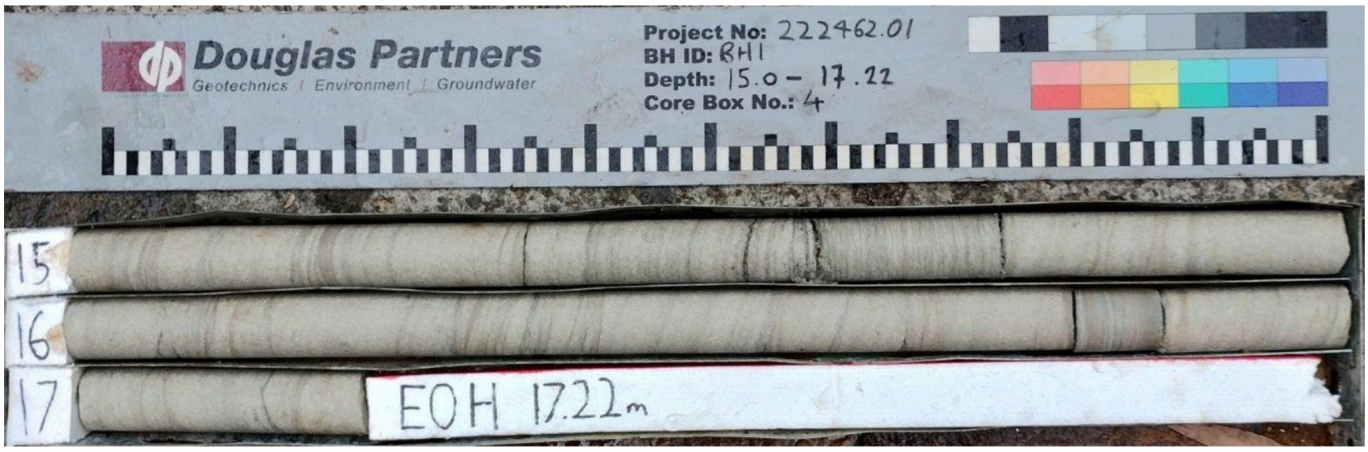
CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 48.1 AHD
COORDINATE: E:325791.8, N:6260745.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 2 of 2

10.00-15.00 m depth



15.00-17.22 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.5 AHD
COORDINATE: E:325795.0, N:6260767.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	48 / 0.11	CONCRETE: pale grey; with igneous aggregates up to 15mm		FILL	(MD)	D		A		0.10			Bentonite	
	0.50	FILL / SAND: orange; coarse; with medium sub-angular sandstone and ironstone gravel.						A		0.40	SPT	20/130 (HB)		
		SAND (SP): orange; with medium sandstone and ironstone gravel.		possibly XWM	VD									
	1.00	Continued as rock												
	47 / 2									2				
	46 / 3									3				
	45 / 4									4				
	44 / 5									5				
	43 / 6									6				
	42 / 7									7				
	41 / 8									8				
	40 / 9									9				
	39												Gravel backfill	

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.

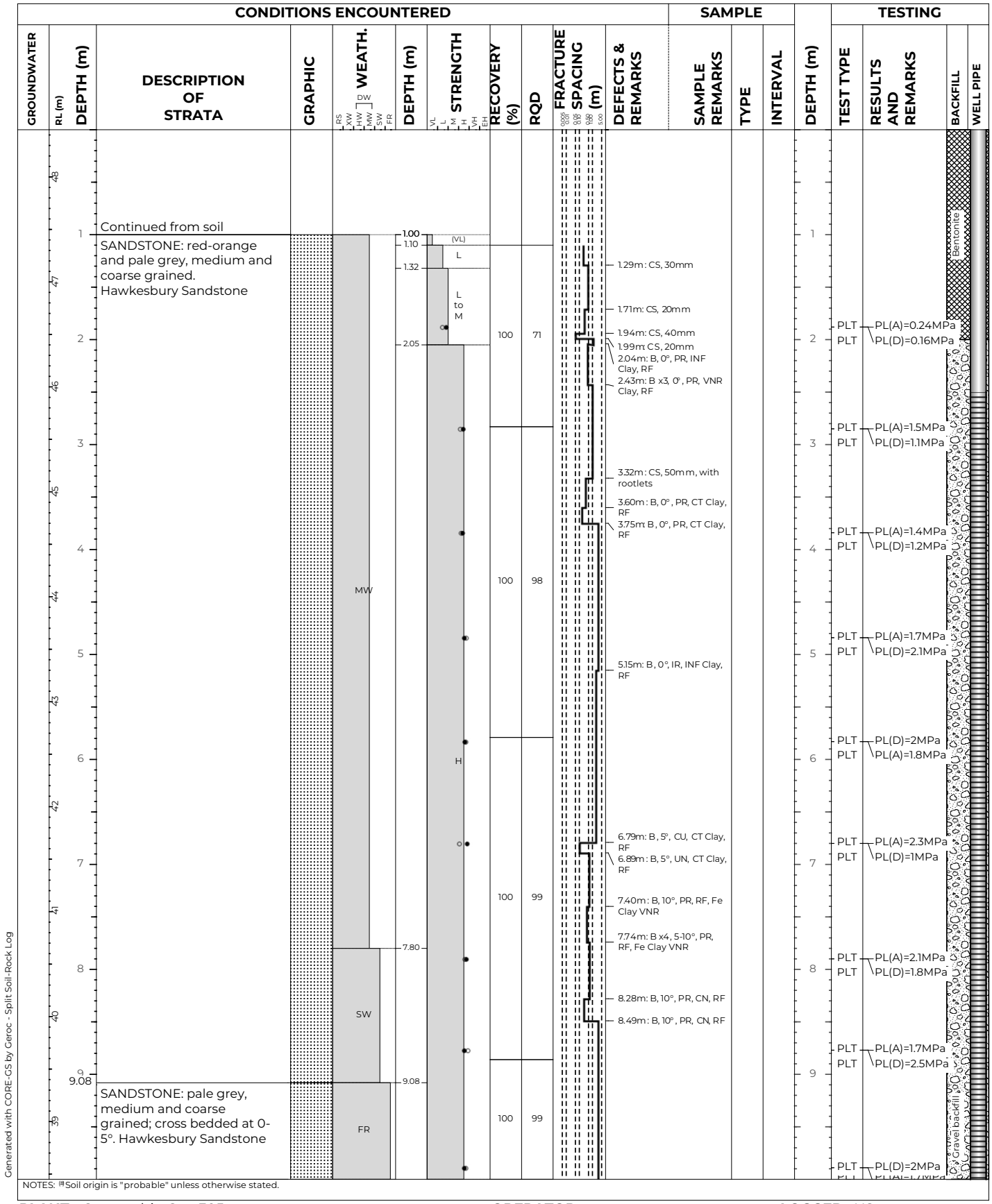
PLANT: Comacchio Geo 305
METHOD: DT to 0.11m, AD/T to 1.1m, NMLC to 17.86m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.5 AHD
COORDINATE: E:325795.0, N:6260767.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 3



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

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

PLANT: Comacchio Geo 305
METHOD: DT to 0.11m, AD/T to 1.1m, NMLC to 17.86m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.5 AHD
COORDINATE: E:325795.0, N:6260767.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
15/02/24 08:34	38	10	[CONT] SANDSTONE: pale grey, medium and coarse grained; cross bedded at 0-5°. Hawkesbury Sandstone												10	PLT	PL(A)=2.2MPa		
	37	11	11.30m: with 1% siltstone flecks and laminations 11.39m-11.41m: dark grey siltstone band					100	99		10.88m: B, 10°, PR, SN CBS, RF				11	PLT	PL(D)=1.8MPa		
											11.38m: B, 10°, PR, CN, RF								
	36	12													12	PLT	PL(A)=2.5MPa		
																PLT	PL(D)=2MPa		
	35	13						100	100		12.58m: B, 10°, PR, CN, RF				13	PLT	PL(A)=2.8MPa		
																PLT	PL(D)=2MPa		
	34	14			FR		H								14	PLT	PL(A)=2MPa		
																PLT	PL(D)=1.8MPa		
	33	15									14.71m: B, 15°, PR, CN, RF				15	PLT	PL(A)=2.3MPa		
																PLT	PL(D)=2MPa		
	32	16						100	100						16	PLT	PL(A)=2MPa		
																PLT	PL(D)=1.6MPa		
	31	17													17	PLT	PL(A)=1.3MPa	Bentonite	
																PLT	PL(D)=1.4MPa		
	30	18	Borehole discontinued at 17.86m depth. Target depth reached.												18	PLT	PL(A)=1.7MPa		
																PLT	PL(D)=1.5MPa		
	29	19													19				

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

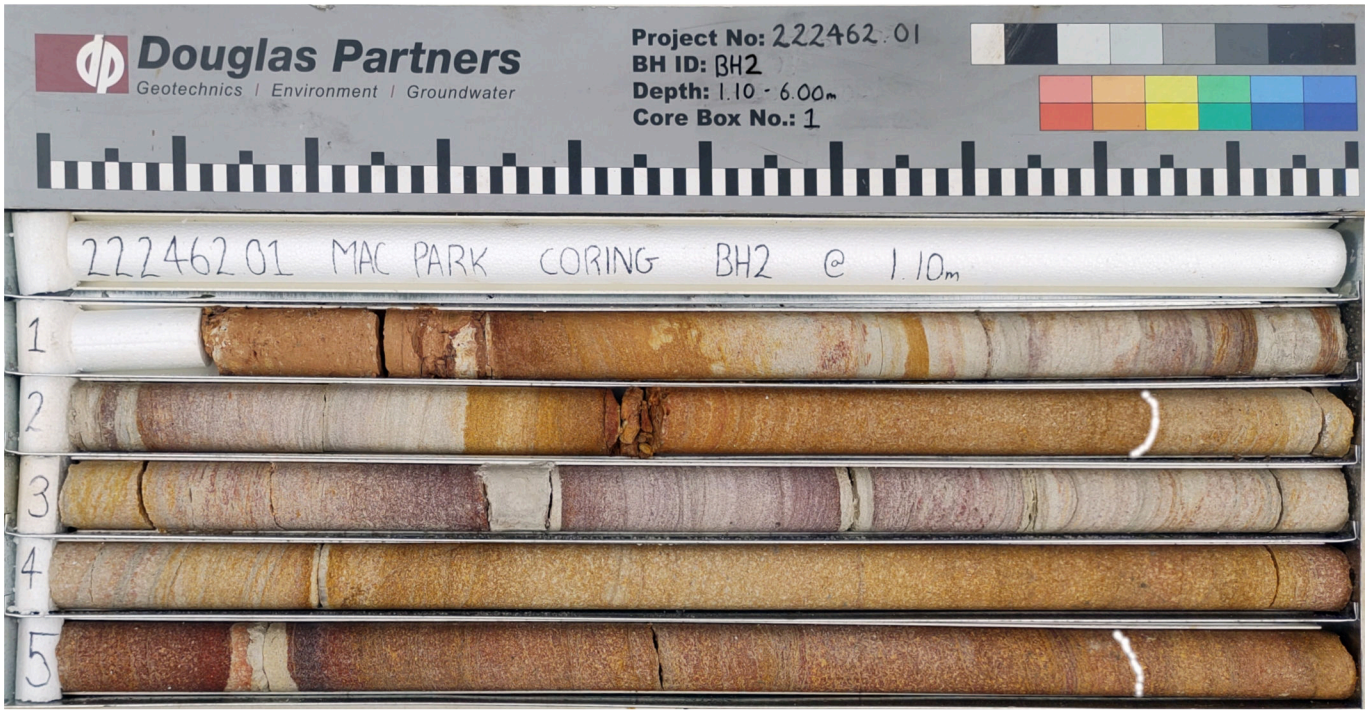
PLANT: Comacchio Geo 305
METHOD: DT to 0.11m, AD/T to 1.1m, NMLC to 17.86m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.5 AHD
COORDINATE: E:325795.0, N:6260767.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 2



1.10-6.00 m depth

6.00-12.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 48.5 AHD
COORDINATE: E:325795.0, N:6260767.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 2

12.00-17.86 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.6 AHD
COORDINATE: E:325821.1, N:6260781.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH3
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
29/01/24 NFGWO while augering	46	0.25	FILL / Silty SAND: brown; fine; with rootlets, brick fragments and orange sandstone gravel.		FILL		D	Partial bulk sample 0-0.25	A	0.10	0.10		
			Clayey SAND (SP): dark orange; medium to coarse; medium plasticity clay.		RS	(MD)	D to M		A	0.50	0.50		
		1.00	Continued as rock								1		
	45	2									2		
	44	3									3		
	43	4									4		
	42	5									5		
	41	6									6		
	40	7									7		
	39	8									8		
	38	9									9		
	37												

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: Comacchio Geo 305
METHOD: HA to 0.25m, AD/T to 1.0m, NMLC to 16.2m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.6 AHD
COORDINATE: E:325821.1, N:6260781.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH3
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 2 of 3

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

GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
29/01/24 NFGWO while augering	46 / 0	Continued from soil			1.00	(VL)								0				
	45 / 1	SANDSTONE: red-orange and pale grey, coarse grained. Hawkesbury Sandstone			1.12	M								1				
					1.58	VL				1.53m: CS, 20mm					PLT	PL(A)=1.9MPa		
					1.81					1.75m: CS, 20mm					PLT	PL(D)=0.78MPa		
	44 / 2									1.79m: CS, 20mm				2				
							100	82		2.18m: B, 0°, PR, CN, RF					PLT	PL(A)=0.9MPa		
	43 / 3			MW										3	PLT	PL(D)=1MPa		
										3.75m: B, 5°, PR, VNR Clay, RF					PLT	PL(A)=1.8MPa		
	42 / 4									4.13m: B, 15°, PR, VNR Clay, RF				4	PLT	PL(D)=1.3MPa		
							100	92							PLT	PL(A)=2.6MPa		
	41 / 5													5	PLT	PL(D)=2.3MPa		
										5.35-5.42m: B x4, 0-5°, PR, CT Fe, RF								
										5.60-5.70m: B x4, 0-5°, PR, CT Fe, RF								
					5.75										PLT	PL(A)=0.82MPa		
	40 / 6			SW										6	PLT	PL(D)=0.99MPa		
	6.66	SANDSTONE: pale grey, coarse grained; cross bedded at 5-10°. Hawkesbury Sandstone			6.66										PLT	PL(A)=1.4MPa		
							100	97							PLT	PL(D)=0.61MPa		
	39 / 7													7				
										7.72m: B, 15°, PR, CN, RF								
										7.79-7.81m: B x3, 5°, PR, Clay, RF					PLT	PL(A)=1.6MPa		
	38 / 8	From 8.38m: with 1% dark grey siltstone flecks and laminations		FR										8	PLT	PL(D)=1.7MPa		
															PLT	PL(A)=2.9MPa		
	37 / 9						100	100						9	PLT	PL(D)=0.93MPa		
															PLT	PL(A)=1MPa		

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

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

PLANT: Comacchio Geo 305
METHOD: HA to 0.25m, AD/T to 1.0m, NMLC to 16.2m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.6 AHD
COORDINATE: E:325821.1, N:6260781.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH3
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	36	10	[CONT] SANDSTONE: pale grey, coarse grained; cross bedded at 5-10°. Hawkesbury Sandstone		FR	11.35	M to H	100	100		10.78m: B, 5°, PR, VNR Clay, RF 10.90m: B, 5°, IR, CT CBS, RF				10	PLT	PL(A)=0.99MPa PL(D)=0.68MPa		
	35	11													11	PLT	PL(A)=2.1MPa PL(D)=1.8MPa		
	34	12									12.66m: B, 5°, UN, CN, RF				12	PLT	PL(A)=1.9MPa PL(D)=2MPa		
	33	13						100	100						13	PLT	PL(A)=1.4MPa PL(D)=1.7MPa		
	32	14					H								14	PLT	PL(A)=1.9MPa PL(D)=2.1MPa		
	31	15						100	100		15.10-15.20m: JT, 30-45°, IR, CN, RF 15.50m: B, 10°, PR, CN, RF 15.63m: B, 0°, PR, CN, RF				15	PLT	PL(A)=1.2MPa PL(D)=1.5MPa		
	30	16	Borehole discontinued at 16.20m depth. Target depth reached.												16	PLT	PL(A)=1.7MPa PL(D)=1.3MPa		
	29	17													17				
	28	18													18				
	27	19													19				

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

PLANT: Comacchio Geo 305
METHOD: HA to 0.25m, AD/T to 1.0m, NMLC to 16.2m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1m

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 46.6 AHD
COORDINATE: E:325821.1, N:6260781.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 1 of 2

1.00-6.00 m depth

6.00-12.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 46.6 AHD
COORDINATE: E:325821.1, N:6260781.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH3
PROJECT No: 222462.01
DATE: 29/01/24
SHEET: 2 of 2

12.00-16.00 m depth

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.9 AHD
COORDINATE: E:325841.6, N:6260798.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH4
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
30/01/24 NFGWO while augering	43.9 / 0.00	CONCRETE: 5-20mm aggregate		FILL		M		A		0.10		
	43.8 / 0.10	FILL / SAND: pale orange-brown; fine to medium; with fine to medium, sub-rounded ripped sandstone gravel; with clay.										
	43.7 / 0.16	Continued as rock										
	43 / 1									1		
	42 / 2									2		
	41 / 3									3		
	40 / 4									4		
	39 / 5									5		
	38 / 6									6		
	37 / 7									7		
	36 / 8									8		
	35 / 9									9		
	34											

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

PLANT: Bobcat
OPERATOR: Groundtest (CS)
LOGGED: AN
METHOD: DT to 0.1m, HA to 0.16m, AD/T to 0.9m, WB to 1.02m; NMLC to 19.2m
CASING: HW to 1m, then HQ to 1.01m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.9 AHD
COORDINATE: E:325841.6, N:6260798.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH4
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 3

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
30/01/24 NFGWO while augering	43	0	Continued from soil			0.16									0				
			SANDSTONE: orange-brown, medium to coarse grained; bedding dipping 0-20°; with 0-10% siltstone laminations. Hawkesbury Sandstone		ND		ND												
	42	1				1.02					1.46m: B, 5°, PR, CT Clay, RF 1.55m: B, 10°, PR, SN Fe, RF 1.78m: B, 10°, PR, SN Fe, RF				1				
							M												
	41	2				2.00		100	94		2.61-2.72m: B x2, 10°, PR, RF, patchy Clay VNR 2.89m: B, 10°, PR, SN Fe, RF				2	PLT	PL(A)=1MPa		
					SW - MW						3.05-3.44m: B x6, 5°, PR, SN Fe, RF								
	40	3									3.57m: B, 5°, PR, CN, RF 3.58-3.68m: B x2, 5°, PR, CT Clay, RF 3.82m: B, 5°, PR, CN, RF				3	PLT	PL(A)=2.3MPa		
											4.14m: B, 10°, PR, CN, RF 4.26m: B, 10°, PR, VNR Clay, RF								
	39	4									4.54m: B, 15°, PR, CN, RF				4	PLT	PL(A)=2.4MPa		
											4.88m: B, 15°, PR, CN, RF								
	38	5	From 5.20m: pale grey			5.20		100	91		5.28m: B, 5°, PR, CN, RF 5.51m: B, 15°, PR, CN, RF				5	PLT	PL(A)=2.6MPa		
							H				5.88-6.05m: B x2, 15°, PR, CN, RF								
	37	6									6.23m: B, 15°, PR, CT Clay, RF 6.25m: B, 15°, PR, CN, RF 6.39-6.49m: B x2, 15°, PR, VNR Clay, RF 6.73m: B, 15°, PR, CN, RF				6	PLT	PL(A)=1.6MPa		
											7.17m: B, 10°, PR, VNR Clay, RF								
	36	7			FR			100	100		7.58m: B, 10°, PR, CN, RF				7	PLT	PL(A)=1.5MPa		
	35	8													8	PLT	PL(A)=2.5MPa		
	34	9									9.48m: B, 15°, PR, CT Clay, RF 9.81m: B, 15°, PR, CN, RF				9	PLT	PL(A)=2.2MPa		
																PLT	PL(A)=1.5MPa		

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

PLANT: Bobcat
OPERATOR: Groundtest (CS)
LOGGED: AN
METHOD: DT to 0.1m, HA to 0.16m, AD/T to 0.9m, WB to 1.02m; NMLC to 19.2m
CASING: HW to 1m, then HQ to 1.01m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.9 AHD
COORDINATE: E:325841.6, N:6260798.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH4
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		10.00	SANDSTONE: pale grey, medium to coarse grained; bedding dipping 0-20°; with 0-10% siltstone laminations. Hawkesbury Sandstone								10.78-10.84m: B x3, 5°, PR, VNR Clay, RF								
	33	11					H				11.23m: B, 0°, PR, RF, patchy Clay VNR				11	PLT	PL(A)=1.6MPa		
			11.45m-11.75m: coarse grained					100	97		11.45m: B, 20°, PR, CN, RF								
	32	12									11.70m: B, 5°, PR, CN, RF				12	PLT	PL(A)=1.2MPa		
											12.34-12.78m: B x3, 15°, PR, CN, RF								
	31	13	From 13.00m: cross bedded dipping 0-20°												13	PLT	PL(A)=1.9MPa		
											13.69m: B, 5°, PR, CT Clay, RF								
	30	14			FR		H	100	100						14	PLT	PL(A)=1.6MPa		
											14.84m: B, 5°, PR, VNR Clay, RF								
	29	15													15	PLT	PL(A)=0.98MPa		
	28	16									16.20m: water loss at 16.2m				16	PLT	PL(A)=1.3MPa		
											16.75m: B, 35°, CU, CN, RF								
	27	17						100	98						17	PLT	PL(A)=1.5MPa		
	26	18	18.95m: Siltstone band 40mm								17.90m: CS, Clay				18	PLT	PL(A)=1.4MPa		
											18.18-18.83m: B x2, 10°, PR, CN, RF								
	25	19	Borehole discontinued at 19.20m depth. Target depth reached.								19.14m: B, 5°, PR, CN, RF				19	PLT	PL(A)=1.5MPa		
																PLT	PL(A)=1.8MPa		
	24																		

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

PLANT: Bobcat
OPERATOR: Groundtest (CS)
LOGGED: AN
METHOD: DT to 0.1m, HA to 0.16m, AD/T to 0.9m, WB to 1.02m; NMLC to 19.2m
CASING: HW to 1m, then HQ to 1.01m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.9 AHD
COORDINATE: E:325841.6, N:6260798.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH4
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 2

1.02-5.00 m depth

5.00-10.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.9 AHD
COORDINATE: E:325841.6, N:6260798.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH4
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 2

10.00-15.00 m depth

15.00-19.20 m depth

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.6 AHD
COORDINATE: E:325852.0, N:6260784.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH5
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(##)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL / WELL PIPE
	43	0.20	CONCRETE: 5-25mm aggregate						A		0.20			Backfill
		0.25	FILL / Sandy CLAY: pale brown; low plasticity; fine to medium sand; trace fine, sub-angular sandstone gravel; (diatube increased moisture content).											
			Continued as rock											
	42	1									1			
		2									2			Bentonite
	41	3									3			
	40	4									4			
	39	5									5			
	38	6									6			
	37	7									7			
	36	8									8			
	35	9									9			
	34													

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

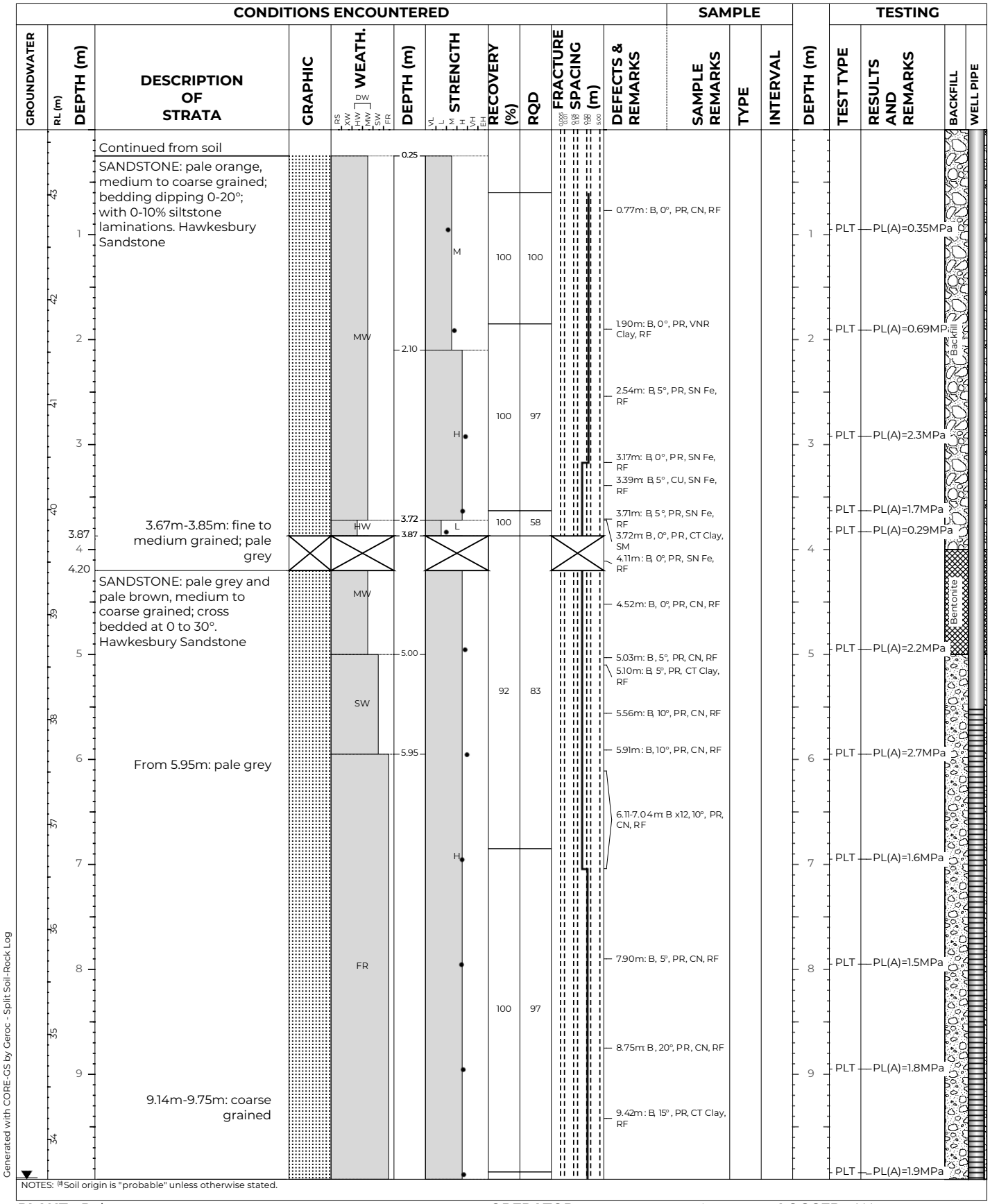
PLANT: Bobcat
METHOD: DT to 0.2m, HA to 0.25, AD/T to 0.6m, NMLC to 18.46m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HW to 0.65m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.6 AHD
COORDINATE: E:325852.0, N:6260784.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH5
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 3



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

PLANT: Bobcat
METHOD: DT to 0.2m, HA to 0.25, AD/T to 0.6m, NMLC to 18.46m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HW to 0.65m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 43.6 AHD
COORDINATE: E:325852.0, N:6260784.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH5
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 3 of 3

CONDITIONS ENCOUNTERED													SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (PS, XW, DW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
15/02/24 08:43	33	10.00	SANDSTONE: pale grey, medium to coarse grained; cross bedded at 0 to 30°. Hawkesbury Sandstone								10.41m: B, 5°, PR, CN, RF				10				
	32	11						100	100						11	PLT	PL(A)=1.9MPa	Gravel backfill	
	31	12													12	PLT	PL(A)=1.6MPa		
	30	13													13	PLT	PL(A)=1.5MPa		
	29	14			FR		H	100	100		14.02m: B, 0°, PR, CT Clay, RF 14.40m: B, 0°, PR, CN, RF				14	PLT	PL(A)=1.7MPa		
	28	15									15.21m: B, 5°, PR, CN, RF 15.42m: B, 10°, PR, CN, RF				15	PLT	PL(A)=1MPa		
	27	16									15.98m: B, 0°, IR, CBS, RF				16	PLT	PL(A)=1.2MPa		
	26	17						100	98						17	PLT	PL(A)=1.3MPa		
	25	18	18.04m-18.08m: with siltstone clasts								17.76m: B, 0°, PR, CT Clay, RF				18	PLT	PL(A)=1.3MPa		
	24	19	Borehole discontinued at 18.46m depth. Target depth reached.												19	PLT	PL(A)=1.5MPa		

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

PLANT: Bobcat
METHOD: DT to 0.2m, HA to 0.25, AD/T to 0.6m, NMLC to 18.46m
REMARKS:
OPERATOR: Groundtest (GM/JS)
LOGGED: AN
CASING: HW to 0.65m

Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

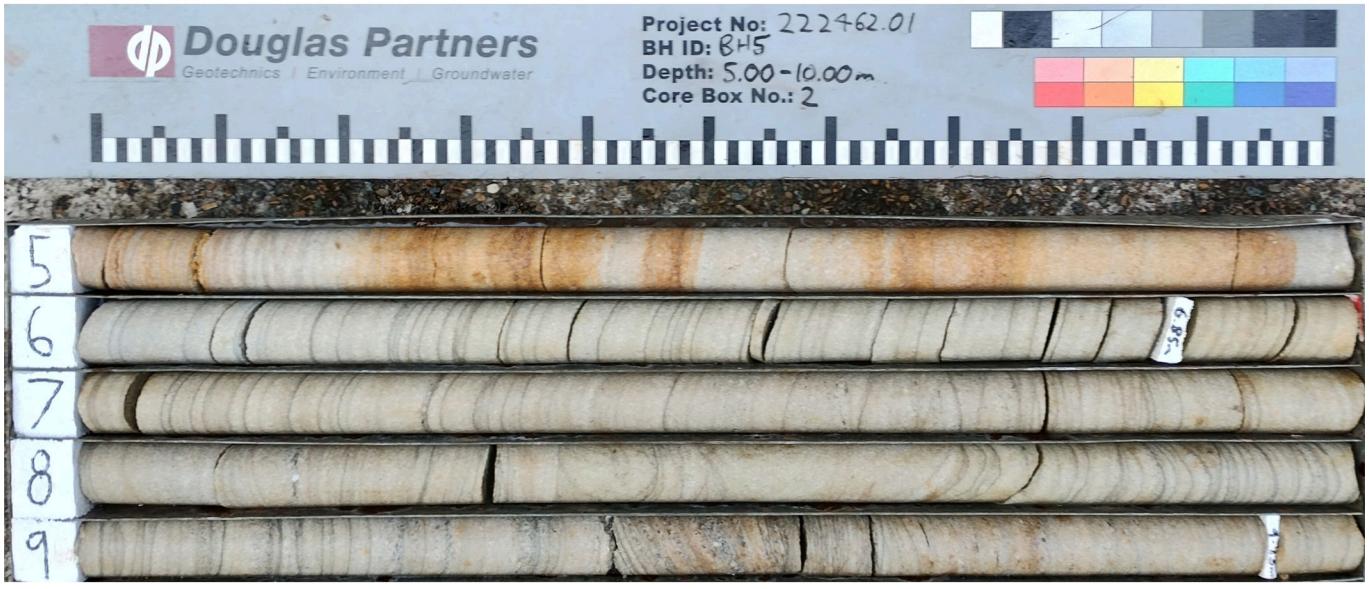
CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 43.6 AHD
COORDINATE: E:325852.0, N:6260784.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 1 of 2

0.60-5.00 m depth



5.00-10.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 43.6 AHD
COORDINATE: E:325852.0, N:6260784.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH5
PROJECT No: 222462.01
DATE: 30/01/24
SHEET: 2 of 2

10.00-15.00 m depth

15.00-18.46 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 45.6 AHD
COORDINATE: E:325833.7, N:6260762.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH6
PROJECT No: 222462.01
DATE: 01/02/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	45	0.14	CONCRETE: 5-25 mm aggregate; 1-5 mm voids												
			Clayey SAND (SC), with gravel: brown and red-brown; fine to medium; fine to medium, sandstone gravel; extremely weathered sandstone.		XWM	MD - D	D		A		0.40			Bentonite	
	44	1.70	Continued as rock						A		1.50	SPT	7,11,19/120		
												SPT	14 (HB)		
	43	2									2				
	42	3									3				
	41	4									4				
	40	5									5				
	39	6									6				
	38	7									7			Gravel backfill	
	37	8									8				
	36	9									9				

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

PLANT: Comacchio Geo 305
OPERATOR: Rockwell (TT)
LOGGED: AN
METHOD: DT to 0.14m, AD/T to 1.7m, NMLC to 14.24m
CASING: HQ to 1.75m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 45.6 AHD
COORDINATE: E:325833.7, N:6260762.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH6
PROJECT No: 222462.01
DATE: 01/02/24
SHEET: 2 of 3

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.2, 0.6, 2.0, >2.0)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	45	0													0				
	44	1	Continued from soil												1			Bentonite	
	43	2	SANDSTONE: red, orange and pale grey, medium to coarse grained; bedding dipping 0° to 15°. Hawkesbury Sandstone			1.70	M	100	54		1.91-1.95m: DS, 40 mm 2.07m: B, 5°, PR, SN Fe, RF 2.13m: B, 15°, PR, SN Fe, RF 2.17m: B, 5°, PR, SN Fe, RF 2.24m: B, 0°, PR, CN, SM				2	PLT	PL(A)=0.66MPa		
	42	3				2.73					2.92m: B, 5°, PR, SN Fe, RF 3.13m: JT, 70°, PR, SN Fe, RF 3.26-3.35m: JT, UN, SN Fe, RF, HE 3.46m: JT, 60°, CU, SN Fe, RF				3	PLT	PL(A)=2MPa		
	41	4			MW			100	100						4	PLT	PL(A)=2.2MPa		
	40	5									4.54m: B, 0-5°, PR, SN Fe, RF				5	PLT	PL(A)=2.1MPa		
	39	6	6.03m: siltstone clast				H								6	PLT	PL(A)=2.1MPa		
	38	7	7.29m: pale-grey			7.29		100	85		6.62m: B, 20°, PR, CN, SM 6.82m: B, 5°, PR, SN Fe, RF 6.86m: B, 0°, PR, SN Fe, SM 7.25m: B, 10°, PR, VNR, SM 7.29m: B, 10°, CU, VNR, SM				7	PLT	PL(A)=1.9MPa		
	37	8			FR						7.52-8.68m: B x9, 10°, PR, VNR, RF				8	PLT	PL(A)=2MPa	Gravel backfill	
	36	9						100	100		8.97m: B, 0°, CBS, RF 9.10m: B, 10°, PR, VNR, RF				9	PLT	PL(A)=1.2MPa		
																PLT	PL(A)=2.3MPa		

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

PLANT: Comacchio Geo 305
METHOD: DT to 0.14m, AD/T to 1.7m, NMLC to 14.24m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: AN
CASING: HQ to 1.75m

Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 45.6 AHD
COORDINATE: E:325833.7, N:6260762.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH6
PROJECT No: 222462.01
DATE: 01/02/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
▼ 15/02/24 08:39	35	10.00	SANDSTONE: pale grey, medium to coarse grained; bedding dipping 0° to 15°. Hawkesbury Sandstone												11	PLT	PL(A)=1.8MPa		
	34							100	100										
	33	12	12.02m-12.04m: siltstone clast		FR		H								12	PLT	PL(A)=1.9MPa		
	32	13						100	100		12.92m: B, 5°, PR, CT Clay, SM				13	PLT	PL(A)=1.7MPa		
	31	14	Borehole discontinued at 14.24m depth. Target depth reached.								13.78m: B, 10°, PR, CN, RF				14	PLT	PL(A)=1.7MPa		
																PLT	PL(A)=1.8MPa		
	30	15													15				
	29	16													16				
	28	17													17				
	27	18													18				
	26	19													19				

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

PLANT: Comacchio Geo 305
METHOD: DT to 0.14m, AD/T to 1.7m, NMLC to 14.24m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: AN
CASING: HQ to 1.75m

Refer to explanatory notes for symbol and abbreviation definitions

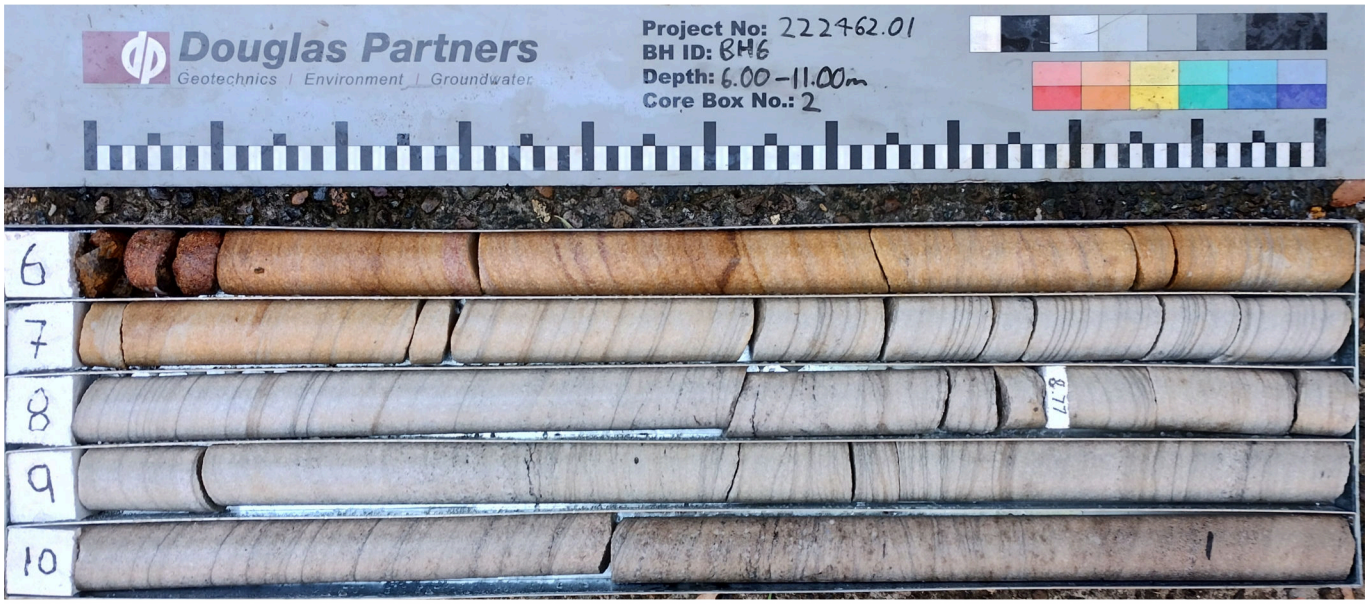
CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113

SURFACE LEVEL: 45.6 AHD
COORDINATE: E:325833.7, N:6260762.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH6
PROJECT No: 222462.01
DATE: 01/02/24
SHEET: 1 of 2

1.39-6.00 m depth



6.00-11.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 45.6 AHD
COORDINATE: E:325833.7, N:6260762.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH6
PROJECT No: 222462.01
DATE: 01/02/24
SHEET: 2 of 2

11.00-14.42 m depth

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.8 AHD
COORDINATE: E:325815.2, N:6260750.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH7
PROJECT No: 222462.01
DATE: 31/01/24
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
31/01/24 NFGWO while augering	46.8 / 0	CONCRETE: 5-20mm thick aggregate					Partial bulk sample 0-0.55	A		0.15		
	0.13	FILL / Sandy CLAY: pale brown; medium plasticity; fine to medium sand; with fine to medium, sub-rounded sandstone gravel; crushed sandstone fill. Slight organic odour.		FILL	(F)	w>PL		A		0.50		
	0.55 / 46	SAND (SP): orange; fine; with fine ironstone gravel; trace clay; inferred extremely weathered bedrock.		XWM	(D) to (VD)	M		A		0.90	SPT	15/50 (HB)
	1 / 45	Continued as rock								1		
	1.24 / 44											
	2 / 43									2		
	3 / 42									3		
	4 / 41									4		
	5 / 40									5		
	6 / 39									6		
	7 / 38									7		
	8 / 37									8		
	9									9		

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

PLANT: Comacchio Geo 305
METHOD: DT to 0.15m, AD/T to 1.1m, NMLC to 16.4m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.8 AHD
COORDINATE: E:325815.2, N:6260750.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH7
PROJECT No: 222462.01
DATE: 31/01/24
SHEET: 2 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
31/01/24 NFGWO while augering	46	0	Continued from soil		SEAM	1.24	SEAM			SEAM					0				
	45	1	SANDSTONE: pale grey and red, medium to coarse grained, thinly bedded; bedding dipping 0-20°; with clay bands to 2.5m; with 0-10% shale laminations. Hawkesbury Sandstone		HW	1.33	M								1				
	44	2			SEAM	1.44	SEAM			SEAM	1.44m: DS 75mm				2	PLT	PL(A)=0.59MPa		
					HW	1.52	M												
					SEAM	1.94	SEAM	100	68	SEAM	1.94m: DS 60mm								
					HW	2.00	M												
					SEAM	2.08	SEAM			SEAM	2.08-2.15m DS, 70mm								
					HW	2.15	M				2.49m: B, 0°, PR, CT Clay, RF								
	43	3				2.80									3	PLT	PL(A)=1.7MPa		
			From 2.80m: orange																
	42	4						100	98						4	PLT	PL(A)=1.7MPa		
		5			MW						4.97m: DS				5	PLT	PL(A)=1.5MPa		
											5.61m: B, 0°, PR, SN Fe, RF								
	41	6									5.74m: B, 10°, PR, CN, RF				6	PLT	PL(A)=1.8MPa		
							H				6.65m: B, 15°, CU, SN Fe, RF								
	40	7				7.00					6.88m: B, 5°, PR, SN Fe, RF				7	PLT	PL(A)=2.8MPa		
											7.03m: B, 10°, IR, SN Fe, RF, patchy Clay VNR								
	39		From 7.39m: pale grey; with carbonaceous flecks		SW			100	83		7.11-7.84m: B x8, 15°, PR, CN, RF								
	38	8	From 7.59m: pale grey			7.90									8	PLT	PL(A)=2MPa		
											8.50m: B, 15°, PR, VNR Clay, RF								
											8.54m: B, 15°, PR, VNR Clay, RF								
		9			FR						8.69m: B, 15°, PR, CN, RF				9	PLT	PL(A)=1.7MPa		
	37							100	98										
											9.68m: B, 15°, PR, CN, RF								
											9.82m: B, 5°, PR, CBS, RF					PLT	PL(A)=2.2MPa		

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

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

PLANT: Comacchio Geo 305
METHOD: DT to 0.15m, AD/T to 1.1m, NMLC to 16.4m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.8 AHD
COORDINATE: E:325815.2, N:6260750.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH7
PROJECT No: 222462.01
DATE: 31/01/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	36	10.00	SANDSTONE: pale grey, medium to coarse grained, thinly bedded; bedding dipping 0-20°; with 0-10% shale laminations. Hawkesbury Sandstone								10.20m: B, 0°, PR, CN, RF 10.35m: B, 0°, PR, CN, RF 10.40m: B, 0°, PR, CN, RF				10				
	35	11						100	98		11.09m: B, 0°, PR, CN, RF				11	PLT	PL(A)=1.7MPa		
	34	12									12.53m: B, 0°, PR, CN, RF				12	PLT	PL(A)=2MPa		
	33	13	12.86m: shale clast		FR		H	100	100		13.19m: B, 5°, PR, CT Clay, RF				13	PLT	PL(A)=2.2MPa		
	32	14													14	PLT	PL(A)=1.4MPa		
	31	15						100	100						15	PLT	PL(A)=2.1MPa		
	30	16									15.95m: B, 5°, PR, CBS, RF				16	PLT PLT	PL(A)=1.8MPa PL(A)=1.6MPa		
	29	17	Borehole discontinued at 16.40m depth. Target depth reached.												17				
	28	18													18				
	27	19													19				

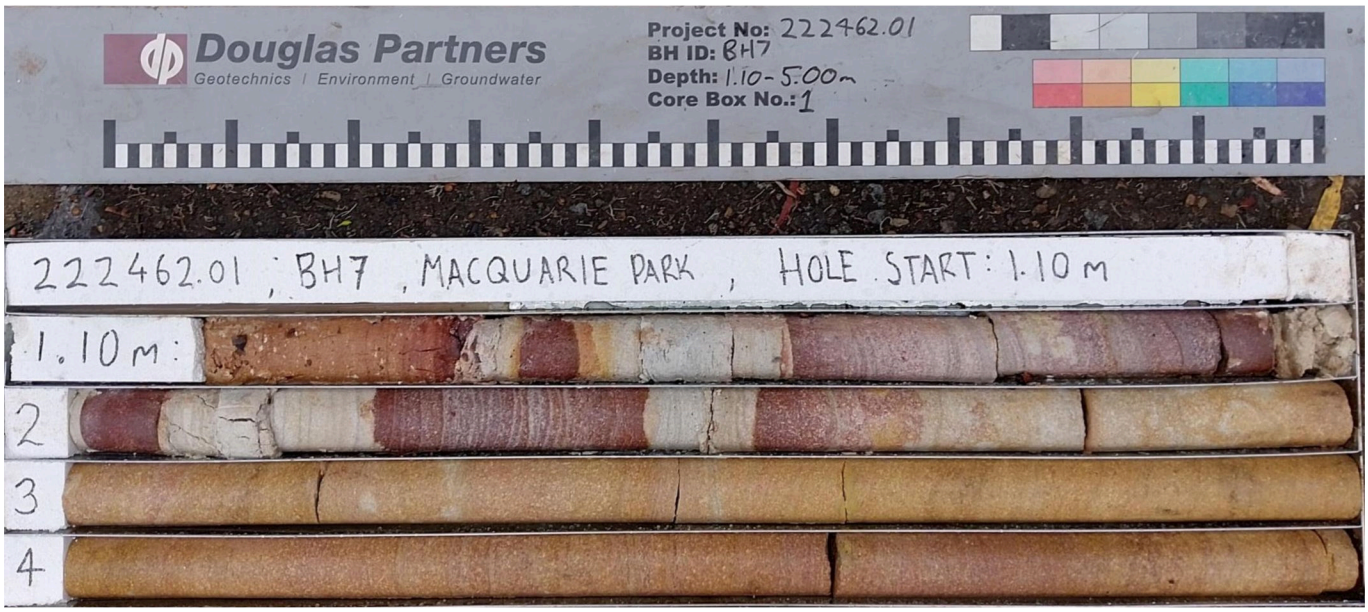
NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Comacchio Geo 305
METHOD: DT to 0.15m, AD/T to 1.1m, NMLC to 16.4m
REMARKS:
OPERATOR: Rockwell (TT)
LOGGED: HS/AN
CASING: HWT to 1.1m

Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.8 AHD
COORDINATE: E:325815.2, N:6260750.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH7
PROJECT No: 222462.01
DATE: 31/01/24
SHEET: 1 of 2



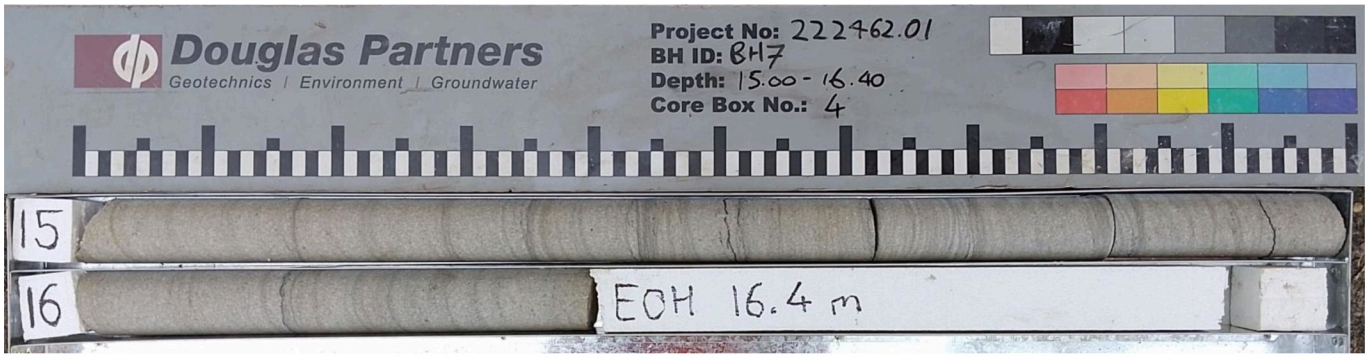
1.10-5.00 m depth

5.00-10.00 m depth

CORE PHOTO LOG

CLIENT: Legacy Property Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.8 AHD
COORDINATE: E:325815.2, N:6260750.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH7
PROJECT No: 222462.01
DATE: 31/01/24
SHEET: 2 of 2

10.00-15.00 m depth



15.00-16.40 m depth

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 1 of 6

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
04/06/25 No Free Groundwater Observed Whilst Augering	44.7	0.15	CONCRETE: pale grey; angular to sub-angular; dark grey, 5-10mm, igneous and crushed brick aggregate.				NA				0.15			Flush cover	
		0.40	FILL / Silty SAND with gravel: brown; medium to coarse; medium, igneous, 10-15mm gravel; trace crushed brick.		FILL		M		A		0.25				
		0.80	SAND (SP) trace gravel: red-brown; medium to coarse; sandstone, 2-5mm gravel; extremely weathered sandstone.		XWM	ND	M - D		A		0.40			Backfill	
	44	1	Continued as rock log								0.50				
	43	2							A		0.70				
	42	3									0.80				
	41	4									1				
	40	5									2				
	39	6									3				
	38	7									4				
	37	8									5				
	36	9									6				
	35										7				
											8				
											9				

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

PLANT: Comachio 305
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
REMARKS:
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
CASING: HWT to 0.8m

Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 2 of 6

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

GROUNDWATER: 04/06/25 No Free Groundwater Observed Whilst Augering

RL (m) | DEPTH (m) | DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE) | GRAPHIC | WEATH. (DW, RS, XW, HW, MW, SW, FR) | DEPTH (m) | STRENGTH (VL, L, M, H, VH, EH) | RECOVERY (%) | RQD | FRACTURE SPACING (m) | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE

Continued from soil log

SANDSTONE: red-brown, mottled pale grey, medium - coarse grained; Hawkesbury Sandstone.

0.80

SANDSTONE: pale grey, medium - coarse grained; with dark grey siltstone flecks and laminations dipping 0-20°. Hawkesbury Sandstone.

5.35

6.50

Depth	Weath.	Strength	Recovery (%)	RQD
0.80 – 5.35	MW - HW	H	100	97
5.35 – 6.50	SW - FR	H	100	89
6.50 – 9.50	FR	H	100	94
9.50 – 9.50			100	97

Defects & Remarks:
- 0.85m: B, 0-5°, IR, CN, RF
- 1.58m: B, 0°, PR, SN Clay, RF, CU,
- 1.80m: B, 0°, PR, CN, RF
- 2.05m: B, 5°, PR, CN, RF
- 3.03m: B, 0°, IR, SN Fe, RF
- 3.21m: B, 10°, PR, SN Fe, healed
- 3.34m: B, 0°, PR, SN Fe, RF
- 3.75m: B, 0°, CU, SN Fe, RF
- 3.84m: B, 0°, IR, SN Fe, RF
- 3.87m: B, 0°, CU, SN Fe, RF, Clay
- 3.96m: B, 5-10°, ST, SN Fe, RF
- 4.13m: B, 5°, PR, SN Clay, RF
- 4.51m: B, 0-5°, UN, SN Clay, RF
- 4.53m: B, 0°, PR, SN Clay, RF
- 4.87-4.89m: B, 20°, IR, SN Fe, RF
- 5.10m: B, 20-30°, PR, SN Clay, RF
- 5.35m: B, 20-30°, UN, Clay, RF
- 5.60m: B, 0-5°, UN, SN Fe, RF
- 6.40m: B, 0-5°, PR, SN Clay, RF
- 6.75m: B, 0°, IR, SN Clay, RF
- 6.92m: B, 5-10°, PR, SN Clay, RF
- 7.55m: B, 0°, CU, SN Clay, RF
- 7.96m: B, 0°, PR, Clay, RF
- 8.73m: B, 0°, PR, SN Clay, RF
- 8.92m: B, 0°, PR Clay, RF, 2-3mm

Depth	Test Type	Results and Remarks
1	PLT	PL(A)=1.2MPa
2	PLT	PL(A)=1.3MPa
3	PLT	PL(A)=1.6MPa
4	PLT	PL(A)=3.0MPa
5	PLT	PL(A)=1.3MPa
6	PLT	PL(A)=1.8MPa
7	PLT	PL(A)=1.7MPa
8	PLT	PL(A)=1.5MPa
9	PLT	PL(A)=1.6MPa
9.5	PLT	PL(A)=1.9MPa

BACKFILL: Flush cover; Backfill
WELL PIPE: Gatic

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

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

PLANT: Comachio 305
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
CASING: HWT to 0.8m
REMARKS:

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 3 of 6

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (PS, XW, DW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	34	10	[CONT] SANDSTONE: pale grey, medium - coarse grained; with dark grey siltstone flecks and laminations dipping 0-20°. Hawkesbury Sandstone.			10.27	H				9.96m: B, 0°, IR, Clay, RF 10.11-10.34m: B x4, 0°, INF Clay, RF, 0-8mm, PR-UN				10				
	33	11	10.27m-10.34m: Siltstone band; dark grey, low to medium strength			10.34		100	97		11.09m: B, 0-5°, ST, CN, RF				11	PLT	PL(A)=1.4MPa		
	32	12									12.20m: B, 5°, PR, HE CBS 2mm				12	PLT	PL(A)=2.1MPa		
	31	13									13.17m: B, 15-20°, PR, CN, RF				13	PLT	PL(A)=1.6MPa		
	30	14									14.27m: B, 0°, IR, CN, RF				14	PLT	PL(A)=1.5MPa		
	29	15			FR		H				14.83m: B, 5°, CU, SN Clay, RF				15	PLT	PL(A)=1.7MPa	Backfill	
	28	16	16.38m-16.42m: Siltstone clasts up to 20mm					100	94		15.42m: B, 10°, PR, SN CBS, RF 16.22m: B, 10°, PR CBS 20mm, RF 16.40m: B, 10°, PR, VNR Clay, RF				16	PLT	PL(A)=1.9MPa		
	27	17													17	PLT	PL(A)=1.8MPa		
	26	18									17.88m: B, 5-10°, IR, SN Clay, RF				18	PLT	PL(A)=2.0MPa		
	25	19						100	100		19.20m: B, 0°, PR, SN Clay, RF 19.26m: B x2, 0-5°, PR Clay, RF, 0-2mm				19	PLT	PL(A)=1.1MPa		
																PLT	PL(A)=1.8MPa		

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

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

PLANT: Comachio 305
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
CASING: HWT to 0.8m
REMARKS:

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 4 of 6

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		21	[CONT] SANDSTONE: pale grey, medium - coarse grained; with dark grey siltstone flecks and laminations dipping 0-20°. Hawkesbury Sandstone. 20.31m-20.36m: Siltstone clasts; 5-15mm		FR		H	100	100		20.40m: B, 5-10°, UN, SN Clay, RF				21	PLT	PL(A)=1.9MPa		
		22						100	100		22.65m: B, 5-10°, PR, CN, RF				22	PLT	PL(A)=1.9MPa		
		23													23	PLT	PL(A)=1.5MPa		
		24									23.67m: B, 15-20°, PR, SN Clay, RF 23.79m: B, 10-15°, PR, CT Clay, RF, 1-2mm				24	PLT	PL(A)=1.6MPa		
		25						100	100		24.76m: B, 5-10°, PR, SN Clay, RF				25	PLT	PL(A)=1.9MPa	Backfill	
		26									25.93m: B, 0°, PR, CN, SM				26	PLT	PL(A)=1.6MPa		
		27									27.33m: B, 0°, PR, CN, RF				27	PLT	PL(A)=1.7MPa		
		28													28	PLT	PL(A)=1.6MPa		
		29									29.12m: B, 0°, PR, CT Clay, SM, 2-3mm				29	PLT	PL(A)=1.6MPa		
																PLT	PL(A)=1.7MPa		

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

PLANT: Comachio 305
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
REMARKS:
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
CASING: HWT to 0.8m

Refer to explanatory notes for symbol and abbreviation definitions

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

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 5 of 6

CONDITIONS ENCOUNTERED

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered) / SOIL MOISTURE	GRAPHIC	WEATH. (PS, XW, HW, MW, SW, FR; DW)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS
	14	31	[CONT] SANDSTONE: pale grey, medium - coarse grained; with dark grey siltstone flecks and laminations dipping 0-20°. Hawkesbury Sandstone. 30.25m-30.50m: Fine grained, grey, thinly laminated 31.47m-32.45m: Carbonaceous flecks					H	100	97		30.29m: B, 0°, PR, SN Clay, RF 30.59m: B, 0°, IR, SN Clay, RF
	13	32										32.25m: B, 0°, PR, Clay, RF
	12	33	32.50m-33.50m: 20-30% fine grained, grey, laminations				32.50					32.46m: B, 0°, PR, CN, RF 32.52m: B, 0°, PR, CN, RF
	11	34							100	96		33.49m: B, 0°, PR, SN Clay, RF
	10	35				FR		M H				
	9	36	35.90m-37.90m: With 20-30% siltstone clasts up to 50mm and wavy siltstone beds up to 40mm thick									35.54m: B x2, 0°, IR, SN Clay, RF 35.73-35.79m: JT, 45°, IR, CN, RF 35.94-35.98m: JT, 30-45°, IR, RF, UN 36.20m: B, 10-15°, IR, SN CBS, RF 36.48m: B, 5-10°, IR, CN, RF
	8	37										36.94m: B, 15-20°, IR, CN, RF 37.17-37.21m: JT, 35-45°, CU, CN, SM 37.38-37.41m: JT, 30-40°, CU, SN Clay, RF
	7	38					37.90		100	93		37.70m: B, 15-50°, IR, CN, RF
	6	39						H				38.78m: B, 0°, IR, CN, RF
	5								100	98		

SAMPLE

SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)
			31
			32
			33
			34
			35
			36
			37
			38
			39

TESTING

TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
PLT	PL(A)=1.9MPa	Backfill	
PLT	PL(A)=1.7MPa	Bentonite	
PLT	PL(A)=1.2MPa		
PLT	PL(A)=1.1MPa		
PLT	PL(A)=0.99MPa		
PLT	PL(A)=0.81MPa	Gravel - 5mm	
PLT	PL(A)=1.3MPa		
PLT	PL(A)=1.5MPa		
PLT	PL(A)=1.4MPa		
PLT	PL(A)=1.4MPa		

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

PLANT: Comachio 305
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
CASING: HWT to 0.8m
REMARKS:

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 6 of 6

CONDITIONS ENCOUNTERED														SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (PS, XW, DW [HW, MW], SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (<0.06, 0.06-0.2, 0.2-0.6, 0.6-2, >2)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	44	0	[CONT] SANDSTONE: pale grey, medium - coarse grained; with dark grey siltstone flecks and laminations dipping 0-20°. Hawkesbury Sandstone.		FR	41	H	100	98		40.46m: B, 0°, PR, Clay, RF, UN 41.43m: B, 0°, PR, SN CBS, RF 41.62m: B, 0-5°, CU, VNR Clay, RF 41.68m: B, 0°, PR, VNR Clay, RF				41	PLT	PL(A)=1.8MPa	Gravel - 5mm	
	43	1													42	PLT	PL(A)=1.4MPa		
	42	2	Borehole discontinued at 42.12m depth. Target depth reached.																
	41	3																	
	40	4																	
	39	5																	
	38	6																	
	37	7																	
	36	8																	
	35	9																	
	34	10																	
	33	11																	
	32	12																	
	31	13																	
	30	14																	
	29	15																	
	28	16																	
	27	17																	
	26	18																	
	25	19																	
	24	20																	
	23	21																	
	22	22																	
	21	23																	
	20	24																	
	19	25																	
	18	26																	
	17	27																	
	16	28																	
	15	29																	
	14	30																	
	13	31																	
	12	32																	
	11	33																	
	10	34																	
	9	35																	
	8	36																	
	7	37																	
	6	38																	
	5	39																	
	4	40																	
	3	41																	
	2	42																	
	1	43																	
	0	44																	
	-1	45																	
	-2	46																	
	-3	47																	
	-4	48																	
	-5	49																	

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

PLANT: Comachio 305
METHOD: DT to 0.15m, then AD/T to 0.8m, then HQ3 to 42.12m
REMARKS:
OPERATOR: Ground Test (LC/JJ)
LOGGED: S. Antoun
CASING: HWT to 0.8m

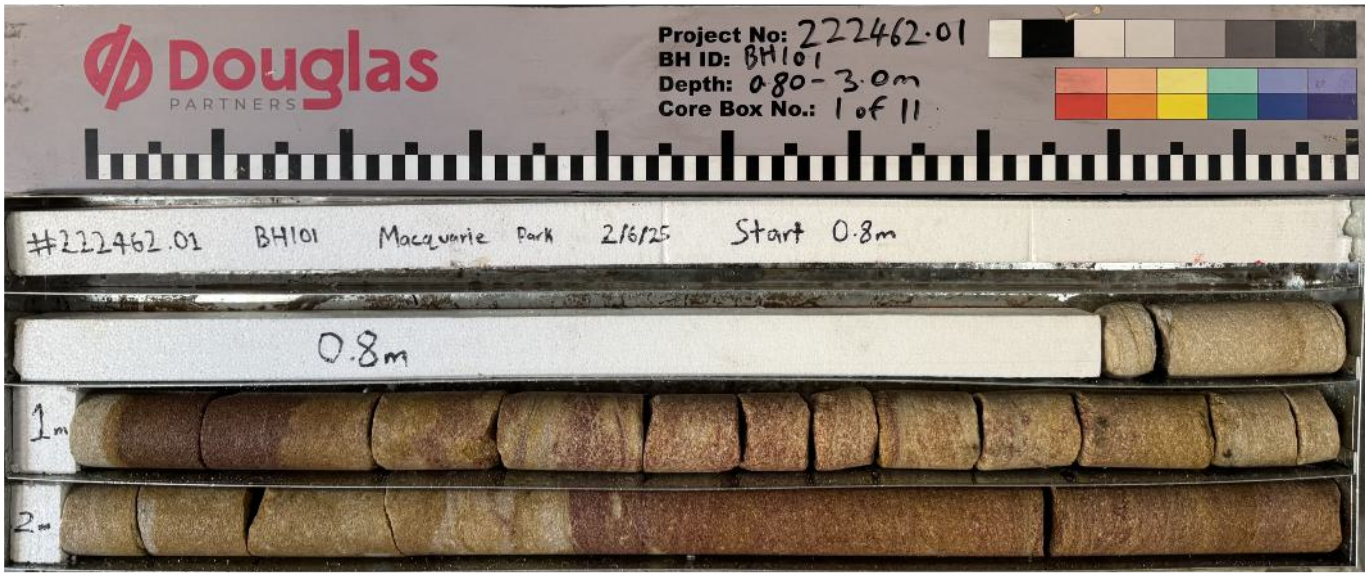
Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 1 of 6



0.80-3.00 m depth

3.00-7.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 2 of 6

7.00-11.00 m depth

11.00-15.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 3 of 6

15.00-19.00 m depth

19.00-23.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 4 of 6

23.00-27.00 m depth

27.00-31.00 m depth

CORE PHOTO LOG

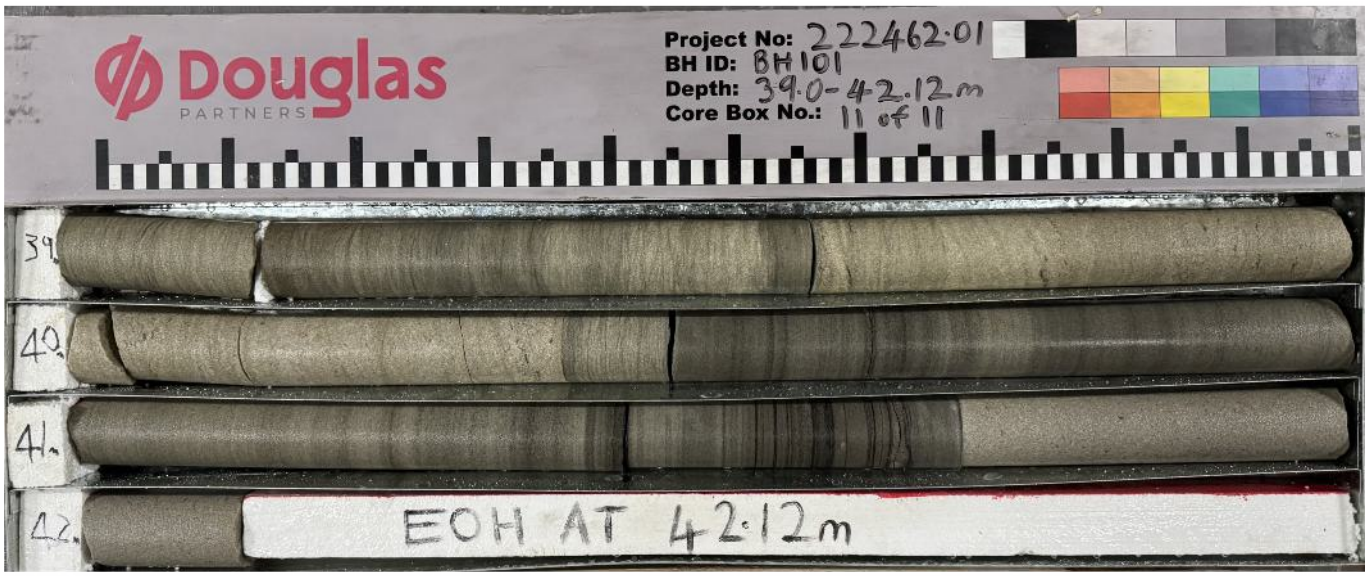
CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 5 of 6

31.00-35.00 m depth

35.00-39.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 44.7 AHD
COORDINATE: E:325832.5, N:6260801.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH101
PROJECT No: 222462.01
DATE: 02/06/25 - 04/06/25
SHEET: 6 of 6



39.00-42.12 m depth

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 1 of 6

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
11/04/25 No free groundwater observed whilst augering	46	0.00	FILL / Silty SAND trace gravel: dark brown; fine to medium; coarse to medium, igneous gravel; trace rootlets.		FILL TOP	ND	M		A		0.10			Backfill	
									A		0.50				
		0.65	SAND (SP): pale orange to brown; fine to medium.		XWM										
		1.06	Continued as rock log						A SPT		1.00 1.06	SPT	25/60		
	45	2									2				
	44	3									3				
	43	4									4				
	42	5									5				
	41	6									6				
	40	7									7				
	39	8									8				
	38	9									9				
	37														

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: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 2 of 6

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00, >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
11/04/25 No free groundwater observed whilst augering	46	0														0				
	45	1	Continued from soil log													1				
			SANDSTONE: pale grey and red brown, medium to coarse grained.		MW - HW	1.06	L				1.27m: B, 0°, IR, CN, RF 1.38m: B, 0°, PR, CN, RF 1.51m: B, 0°, PR, CN, RF 1.54m: B, 0°, PR, VNR Clay, RF 1.62m: B, 0°, PR Clay, RF 1.89m: B, 15°, PR, CN, RF 2.13m: B, 0°, PR, Clay 3mm, RF, CBS(2-3mm)							
						1.62	VL													
	44	2				1.77		100	91							2	PLT	PL(A)=0.76MPa		
		3									3.17m: B, 15°, PR, CN, RF					3	PLT	PL(A)=1.9MPa		
	43				MW - HW		M - H													
		4	4.22m: Dark grey siltstone clasts, 10-20mm								4.05m: B, 0°, PR, VNR Clay, RF 4.22m: B, 0°, IR, CN, RF 4.30m: B, 5°, CU, SN Fe, RF 4.50m: B, 0°, Clay 3mm, CBS(2-3mm)					4	PLT	PL(A)=1.6MPa		
	42		4.61m-4.64m: Brown siltstone clast,40-50mm					100	86		4.83m: B, 0°, PR, SN Fe, RF									
		5									5.16m: B, 5-10°, CU, SN Fe, RF 5.49m: B, 5°, UN, Clay, RF, PR 5.70m: B, 0-5°, CU, SN Clay, RF 5.75m: B, 0°, IR, SN Fe, RF 5.78m: B, 0°, IR, INF Clay 5mm, RF, Fe SN 5.82m: B, 10-15°, PR, CN, RF 5.94m: B, 0°, IR, SN Clay, RF 6.80m: B, 5°, PR, SN Fe, RF					5	PLT PLT PLT	PL(A)=2.0MPa PL(D)=0.17MPa PL(D)=0.16MPa		
	41		5.70m-5.75m: Dark grey siltstone clast, 5-15mm			5.80														
		5.92	SANDSTONE: pale grey, medium to coarse grained; with 5-10° dark grey siltstone laminations.		SW - FR											6	PLT PLT	PL(A)=1.0MPa PL(D)=1.9MPa		
	40	6																		
		7						100	98		7.42m: B, 0°, PR, SN Fe, partially healed					7	PLT PLT	PL(A)=2.1MPa PL(D)=4.9MPa		
	39						H													
		8				8.00					8.05m: B, 10-15°, PR, CN, RF					8	PLT PLT	PL(A)=1.7MPa PL(D)=2.3MPa		
	38																			
		9			FR						9.19m: B, 0°, PR, CN, SM					9	PLT PLT	PL(A)=1.5MPa PL(D)=3.1MPa		
	37							100	100		9.53m: B, 25°, PR, SN Clay, RF									
																	PLT	PL(A)=1.9MPa		

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

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 3 of 6

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00, >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	36	10	[CONT] SANDSTONE: pale grey, medium to coarse grained; with 5-10° dark grey siltstone laminations.								10.20m: B, 0°, PR, INF Clay 2mm, RF 10.30m: B, 10-15°, PR, INF Clay 2mm, RF				10	PLT	PL(D)=1.5MPa		
	35	11						100	100						11	PLT	PL(A)=1.8MPa		
	34	12	12.35m-12.37m: Siltstone clast, dark grey, 40-50mm								12.72m: B, 5-10°, PR, INF Clay 2mm, RF				12	PLT PLT	PL(A)=1.8MPa PL(D)=2.5MPa		
	33	13					H	100	100		13.63m: B, 10-15°, IR, SN CBS, RF				13	PLT	PL(A)=2.1MPa		
	32	14													14	PLT PLT	PL(D)=2.6MPa PL(A)=1.5MPa		
	31	15			FR						14.90m: B, 5°, PR, Clay, SM 15.44m: B, 0°, PR, CN, RF				15	PLT	PL(A)=1.4MPa	Backfill	
	30	16						100	97		15.79m: B, 0°, PR, CN, RF 15.83m: B, 0°, PR, SN Clay, RF 16.49m: B, 0°, PR, SN Clay, RF				16	PLT	PL(A)=2.0MPa		
	29	17				17.00					17.60-17.61m: B x2, 0°, PR, INF Clay 3mm, RF				17	PLT	PL(A)=1.2MPa		
	28	18					M - H	100	100		18.64m: B, 10-15°, PR, SN Clay, RF				18	PLT	PL(A)=0.99MPa		
	27	19						100	100		19.76m: B, 5°, PR, SN Clay, RF 19.94m: B, 5°, PR, INF				19	PLT	PL(A)=1.0MPa		
																PLT	PL(A)=1.3MPa		

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 4 of 6

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	26	21	[CONT] SANDSTONE: pale grey, medium to coarse grained; with 5-10° dark grey siltstone laminations.			20.00		100	100		Clay 3mm, RF 20.07m: B, 0°, PR, SN CBS, RF 20.24m: B, 0°, PR, INF Clay 4mm, RF				21	PLT	PL(A)=1.4MPa		
	25	22													22	PLT	PL(A)=1.8MPa		
	24	23	22.64m-22.66m: Dark grey siltstone clasts, 20-30mm					100	100		22.63m: B, 0°, PR, SN Clay, RF 23.13m: B, 5-10°, PR, CN, RF 23.55m: B, 10-15°, IR, CN, RF				23	PLT	PL(A)=2.0MPa		
	23	24													24	PLT	PL(A)=2.1MPa		
	22	25			FR		H	100	100		24.77m: B, 5°, PR, INF Clay 2mm, RF				25	PLT	PL(A)=1.8MPa	Backfill	
	21	26									25.84m: B, 0°, PR, INF Clay 4mm, RF				26	PLT	PL(A)=1.9MPa		
	20	27													27	PLT	PL(A)=1.4MPa		
	19	28									27.80m: B, 5°, PR, CN, RF				28	PLT	PL(A)=1.8MPa		
	18	29						100	100		28.78m: B, 0°, PR, SN Clay, SM				29	PLT	PL(A)=2.4MPa		
	17										29.89m: B, 0°, PR, CN, RF					PLT	PL(A)=1.8MPa		

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 5 of 6

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.2, 0.6, >0.6)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	16	31	[CONT] SANDSTONE: pale grey, medium to coarse grained; with 5-10° dark grey siltstone laminations.			31									31	PLT	PL(A)=1.9MPa	Backfill	
	15							100	100										
		32	31.74m-31.82m: With dark grey siltstone clasts, 10-25mm			32									32	PLT	PL(A)=1.5MPa		
	14																		
		33	From 33.00m: With bands of fine to medium grained sandstone interlaminated with siltstone, up to 0.4m thick			33					33.06m: B, 0°, PR, VNR Clay, SM 33.28m: B, 0-5°, PR, SN Clay, SM 33.70m: B, 5°, PR, Clay, RF, 1-3mm				33	PLT	PL(A)=1.3MPa		
	13																	Bentonite	
		34				34									34	PLT	PL(A)=1.9MPa		
	12							100	100		34.36m: B, 10-15°, IR, SN CBS, RF								
		35	34.98m-35.00m: Dark grey siltstone clast, 20-25mm		FR	35	H				35.11m: B, 0-5°, IR, SN CBS, RF 35.21m: B, 5°, PR, CN, RF				35	PLT	PL(A)=1.3MPa		
	11																		
		36				36									36	PLT	PL(A)=1.2MPa		
	10																		
		37	37.23m-37.28m: With siltstone and quartz clasts 10-20mm			37					37.20m: B, 0°, IR, VNR Clay, RF				37	PLT	PL(A)=1.2MPa	Gravel	
	9							100	100		37.60m: B, 0°, PR, SN CBS, RF								
		38	37.42m-37.50m: Dark grey siltstone clasts, approximately 20-25mm			38					38.52m: B, 0-5°, PR, SN CBS, RF				38	PLT	PL(A)=1.4MPa		
	8																		
		39				39					39.18m: B, 5°, PR, SN CBS, RF				39	PLT	PL(A)=2.0MPa		
	7							100	100		39.52m: B, 5-10°, IR, SN CBS, RF								
																PLT	PL(A)=1.9MPa		

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

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

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 6 of 6

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	6	41	[CONT] SANDSTONE: pale grey, medium to coarse grained; with 5-10° dark grey siltstone laminations.			40.50	H	100	100						41	PLT	PL(A)=1.1MPa		
	5		41.67m: Dark grey siltstone clast, approximately, 5-10mm		FR		M				41.68m: B, 5-10°, IR, CN, RF								
	4	42	42.38m-42.42m: Dark grey siltstone clasts, approximately 5-20mm				H				42.46m: B, 50°, PR, CN, RF				42	PLT	PL(A)=1.1MPa	Gravel	
	3	43						100	100		43.39m: B, 0°, PR, SN Clay, RF				43	PLT	PL(A)=1.4MPa		
	2	44	Borehole discontinued at 44.00m depth. Target depth reached.													PLT	PL(A)=0.96MPa		
	1	45																	
	0	46																	
	-1	47																	
	-2	48																	
	-3	49																	

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.06m, then HQ3 to 44m
CASING: HW to 1.06m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 1 of 6

1.06-4.00 m depth

4.00-8.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 2 of 6

8.00-12.00 m depth

12.00-16.00 m depth

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 3 of 6

16.00-20.00 m depth

20.00-24.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 4 of 6

24.00-28.00 m depth

28.00-32.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 5 of 6

32.00-36.00 m depth

36.00-40.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 46.3 AHD
COORDINATE: E:325819.8, N:6260775.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH102
PROJECT No: 222462.01
DATE: 11/04/25
SHEET: 6 of 6

40.00-44.00 m depth

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 1 of 6

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
09/04/25 No free groundwater observed whilst augering	47	0.00	FILL / Silty SAND trace gravel: dark brown; fine to medium; coarse to medium, igneous gravel; trace rootlets.		FILL TOP	ND	ND		A		0.10			Flush cover	
									A		0.40 0.50				
		0.85	SAND (SP): pale orange to brown; fine to medium; trace pale grey nodules of clay.		XWM				A		0.90 1.00				
									SPT		1.21	SPT	15,25/60		
	46	1.30	Continued as rock log											Backfill	
	45	2									2				
	44	3									3				
	43	4									4				
	42	5									5				
	41	6									6				
	40	7									7				
	39	8									8				
	38	9									9				

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

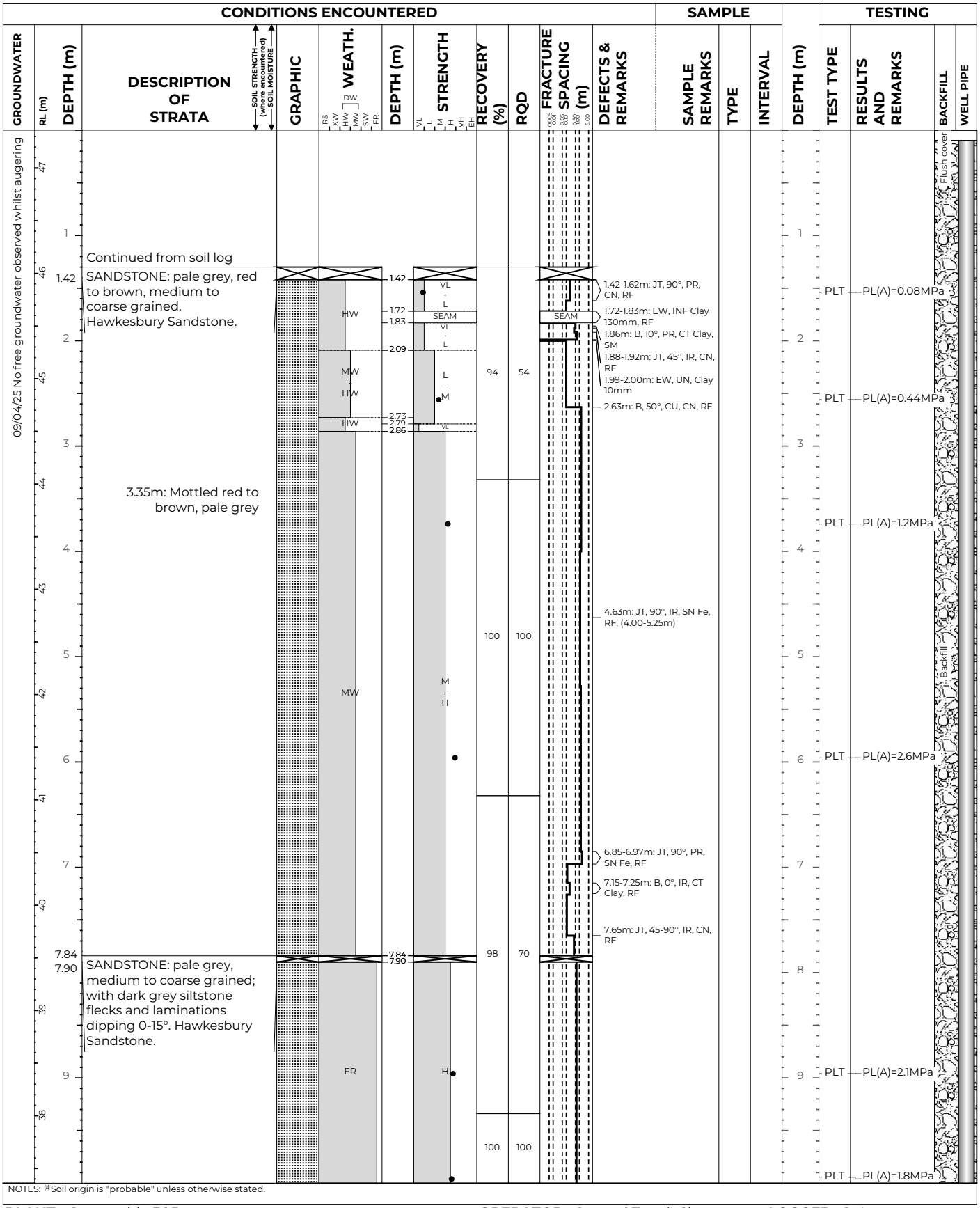
PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
CASING: HWT to 1.3m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

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

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 2 of 6



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

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
CASING: HWT to 1.3m
REMARKS:

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 3 of 6

CONDITIONS ENCOUNTERED															SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (RS, XW, DW [HW, MW], SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00, >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	37	10				10						10.67m: B, 0-5°, IR, CN, RF				10				
	36	11						100	100							11	PLT	PL(A)=1.7MPa		
	35	12														12	PLT	PL(A)=1.9MPa		
	34	13														13	PLT	PL(A)=1.7MPa		
	33	14						100	100							14	PLT	PL(A)=2.0MPa		
	32	15			FR		H					14.59m: B, 0°, IR, SN CBS, RF				15	PLT	PL(A)=1.7MPa	Backfill	
	31	16														16	PLT PLT	PL(A)=1.7MPa PL(A)=1.9MPa		
	30	17						100	63			16.44-16.45m: B, 25°, PR, VNR Clay, RF 16.94m: JT, 80-90°, IR, CN, RF, (16.5-17.38m)				17	PLT	PL(A)=1.4MPa		
	29	18										17.34m: JT, 45°, IR, CN, RF 17.35m: JT, 60°, PR, CN, RF 17.57m: B, 0°, IR, VNR Clay, RF 17.99m: JT, 60°, IR, CN, RF, (17.77-18.20m)				18	PLT	PL(A)=1.4MPa		
	28	19				19.90		100	75			18.57m: JT, 80-90°, IR, CN, RF, (18.32-18.81m) 18.97m: B, 5°, PR, VNR Clay, RF 19.89m: JT, 80-90°, IR, CN, RF				19	PLT	PL(A)=1.4MPa		

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

PLANT: Comacchio 305
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
REMARKS:
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
CASING: HWT to 1.3m

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 4 of 6

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

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	27							100	75		20.50m: JT, 80-90°, UN, CN, RF, (19.75-21.18m)									
	26	21						100	100							21				
	25	22	21.62m-22.27m: Very thin, dark grey laminations of carbonaceous material				M				21.90m: JT, 65°, PR, CN, RF, (21.78-22.02m)					22	PLT	PL(A)=0.37MPa		
	24	23	22.81m-22.87m: 30% siltstone and quartz clasts up to 20 mm 23.14m-23.24m: Layer of dark grey siltstone			22.85		100	100		22.13m: B, 0°, IR, VNR CBS, RF 22.50m: JT, 70-80°, UN, CN, RF, (22.35-22.62m) 22.65m: B, 0°, UN, VNR CBS, RF					23	PLT	PL(A)=1.7MPa		
	23	24									23.07m: JT, 70-90°, CU, CN, RF, (22.97-23.15m) 23.40m: B, 10°, PR, VNR Clay, RF					24	PLT PLT	PL(A)=1.7MPa PL(A)=1.9MPa		
	22	25			FR											25	PLT	PL(A)=1.7MPa	Backfill	
	21	26	25.50m-27.68m: Very thin, dark grey laminations of carbonaceous material				H	100	100							26	PLT	PL(A)=2.1MPa		
	20	27									26.92m: B, 5°, PR, CT Clay 1mm, RF,					27	PLT	PL(A)=1.8MPa		
	19	28														28	PLT	PL(A)=1.9MPa		
	18	29	29.18m-29.43m: Carbonaceous flecks in sandstone					100	100		29.80m: JT, 70°, PR, CN, RF, (29.61-30.00m)					29	PLT	PL(A)=1.6MPa		

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
CASING: HWT to 1.3m
REMARKS:

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 5 of 6

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

GROUNDWATER | RL (m) | DEPTH (m) | DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE) | GRAPHIC | WEATH. (PS, XW, DW [HW, MW], SW, FR) | DEPTH (m) | STRENGTH (VL, L, M, H, VH, EH) | RECOVERY (%) | RQD | FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00) | DEFECTS & REMARKS | SAMPLE REMARKS | TYPE | INTERVAL | DEPTH (m) | TEST TYPE | RESULTS AND REMARKS | BACKFILL | WELL PIPE

Depth (m)	RL (m)	Description of Strata	Weath.	Strength	Recovery (%)	RQD	Defects & Remarks	Test Type	Results and Remarks
31	16				100	100		PLT	PL(A)=1.6MPa
32	15	32.00m-34.00m: Carbonaceous flecks in sandstone			100	100		PLT	PL(A)=1.9MPa
33	14							PLT	PL(A)=1.7MPa
34	13	34.00m-34.86m: Carbonaceous laminations thinly bedded		H	100	97		PLT	PL(A)=1.5MPa
35	12		FR				34.91m: B, 0-5°, PR, Clay, RF 35.34m: DS, 5°, 10mm 35.40m: EW, Clay 10mm	PLT PLT	PL(A)=1.7MPa PL(A)=2.2MPa
36	11	35.90m-36.03m: Siltstone clasts embedded in sandstone approximately 10-25mm						PLT	PL(A)=1.9MPa
37	10				100	95	37.12m: B, 0-15°, IR, VNR Clay, RF	PLT	PL(A)=1.1MPa
38	9			38.27			38.36-38.40m: B, 5-10°, PR, VNR Clay, RF	PLT	PL(A)=0.95MPa
39	8	38.41m-38.72m: Coarse grained, brecciated, with quartz and siltstone clasts		M H			38.90m: B, 10°, UN, VNR CBS, RF 38.96m: JT, 30°, PR, CT Clay, RF	PLT	PL(A)=1.1MPa
					100	97	39.76m: B, 0°, PR, VNR CBS, RF		
				39.85 H				PLT	PL(A)=1.7MPa

BACKFILL: Backfill; Bentonite; Gravel

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

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
CASING: HWT to 1.3m
REMARKS:

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 6 of 6

CONDITIONS ENCOUNTERED														SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (PS, XW, HW, DW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	7	41	40.64m-42.40m: Carbonaceous flecks in sandstone 41.18m: Dark grey siltstone clast approximately 10mm		FR		H	100	97		40.41m: B, 0°, PR, VNR Clay, RF 40.48m: B, 25°, UN, CN, RF				41	PLT	PL(A)=1.7MPa	Gravel	
	6	42													42	PLT	PL(A)=1.3MPa		
	5	43									42.60m: B, 0°, PR, VNR Clay, RF 43.18m: B, 0°, PR, VNR CBS, RF 43.31m: B, 30°, PR, VNR Clay, RF				43	PLT	PL(A)=2.0MPa		
	4	44						100	99						44	PLT	PL(A)=1.4MPa		
	3	45													45	PLT	PL(A)=1.5MPa		
	2	46	Borehole discontinued at 45.20m depth. Target depth reached .																
	1	47																	
	0	48																	
	-1	49																	
	-2																		

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

PLANT: Comacchio 305
OPERATOR: Ground Test (LC)
LOGGED: S. Antoun
METHOD: AD/T to 1m, then WB to 1.3m, then HQ3 to 45.2m
CASING: HWT to 1.3m
REMARKS:

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

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 1 of 6

BH103: 1.30-4.00 m depth

BH103: 4.00-8.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25

BH103: 8.00-12.00 m depth

BH103: 12.00-16.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 3 of 6

BH103: 16.00-20.00 m depth

BH103: 20.00-24.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 4 of 6

BH103: 24.00-28.00 m depth

BH103: 28.00-32.00 m depth

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 5 of 6

BH103: 32.00-36.00 m depth

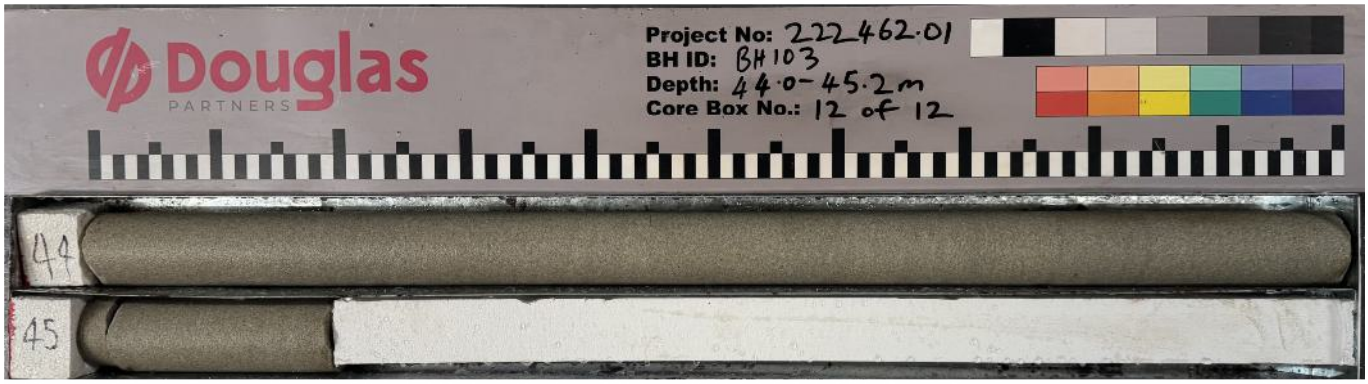
BH103: 36.00-40.00 m depth

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Cottonwood Development Pty Ltd
PROJECT: Proposed Mixed-Use Residential Redevelopment
LOCATION: 15-21 Cottonwood Crescent, Macquarie Park, NSW 2113
SURFACE LEVEL: 47.4 AHD
COORDINATE: E:325808.7, N:6260757.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH103
PROJECT No: 222462.01
DATE: 09/04/25
SHEET: 6 of 6

BH103: 40.00-44.00 m depth

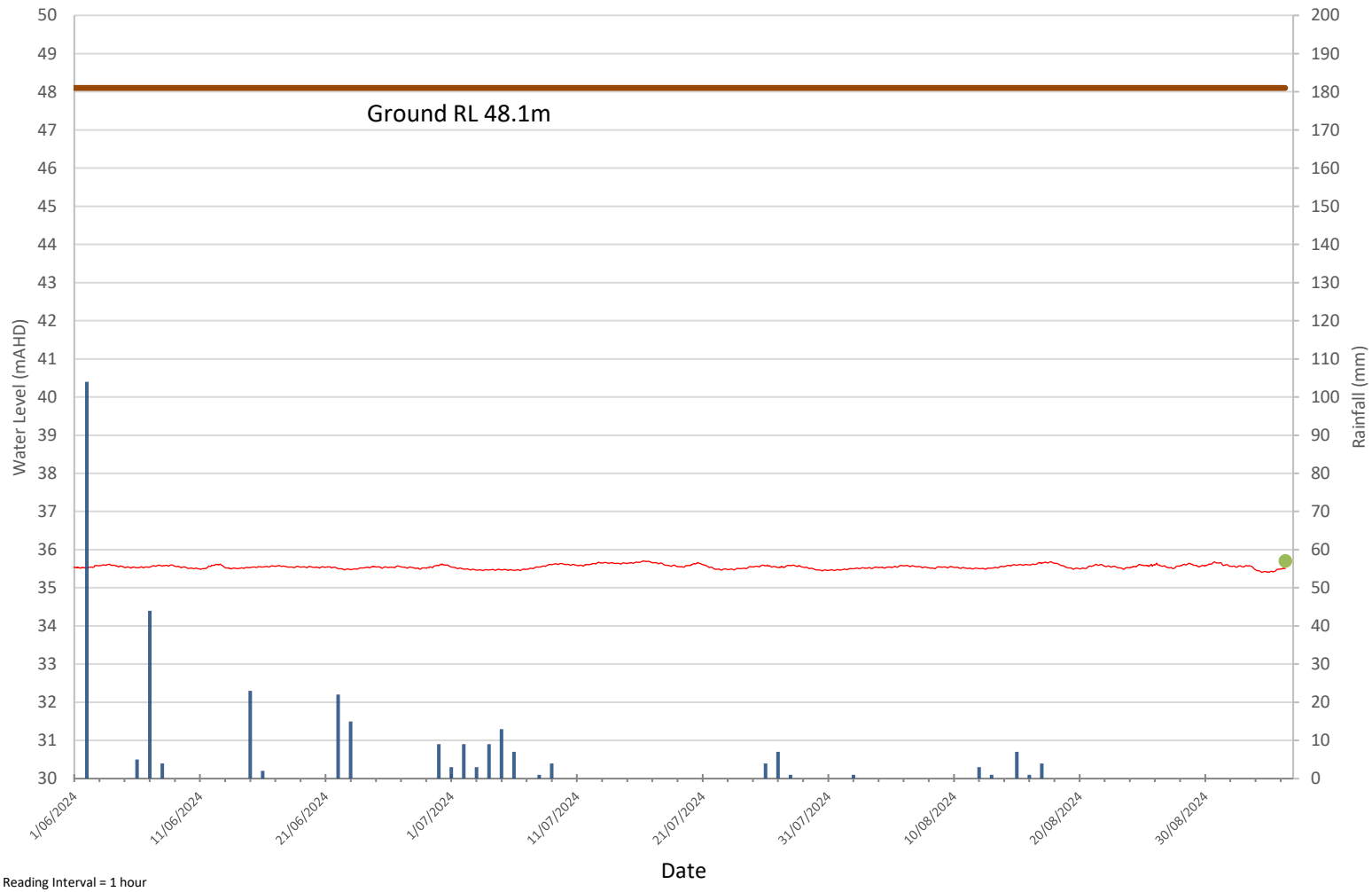


BH103: 44.00-45.20 m depth

Appendix D

Hydrographs

BH1



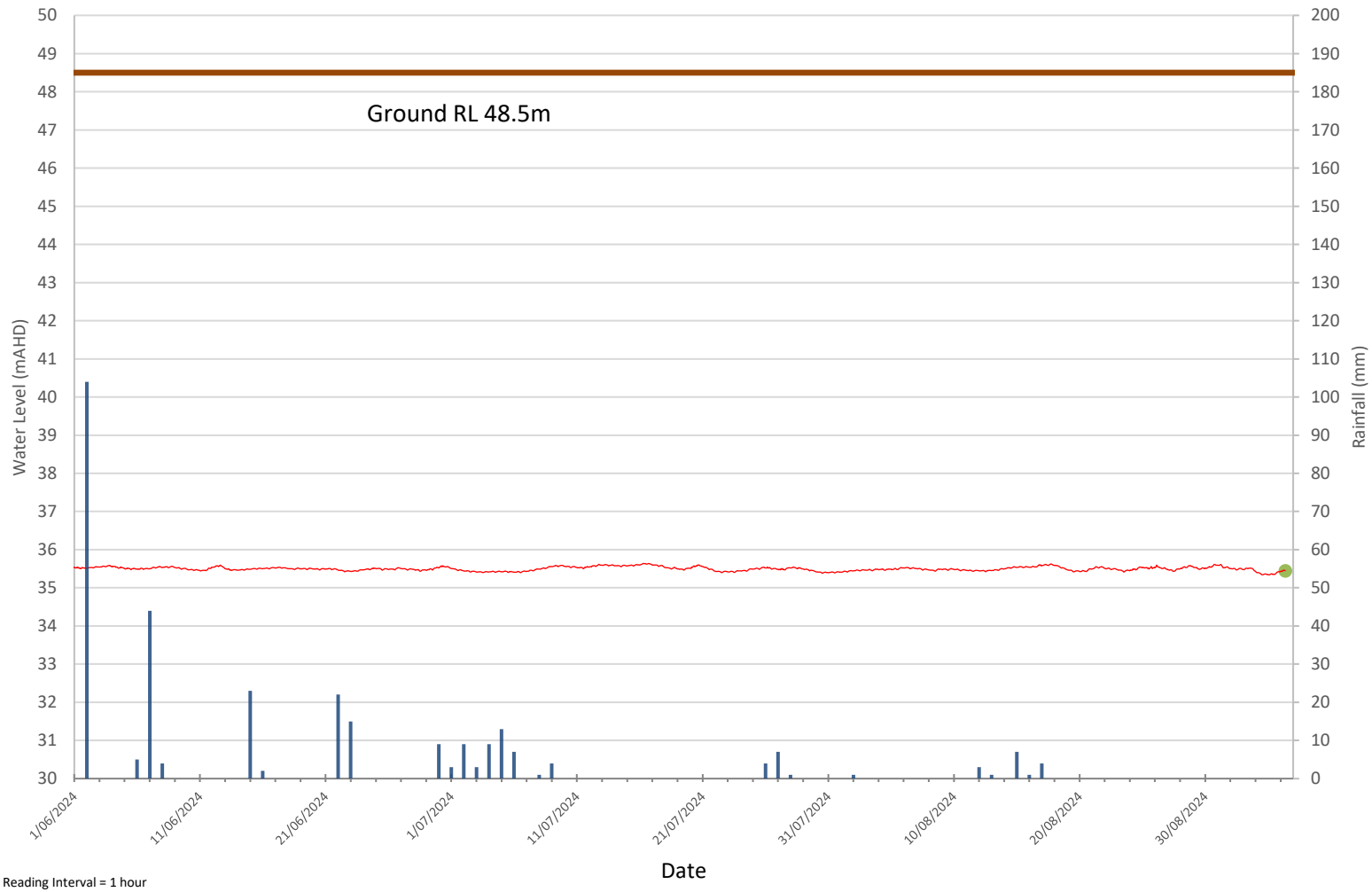
Note: Reading Interval = 1 hour

Douglas PARTNERS

Manual Levels
Water Level
Rainfall data (ST: 66213 North Ryde Golf Club)

Date:	From	Drawn:
12/09/2024	1/06/2024	RMM
Project:	**To**	**Checked:**
212194.01	5/09/2024	STE

BH2



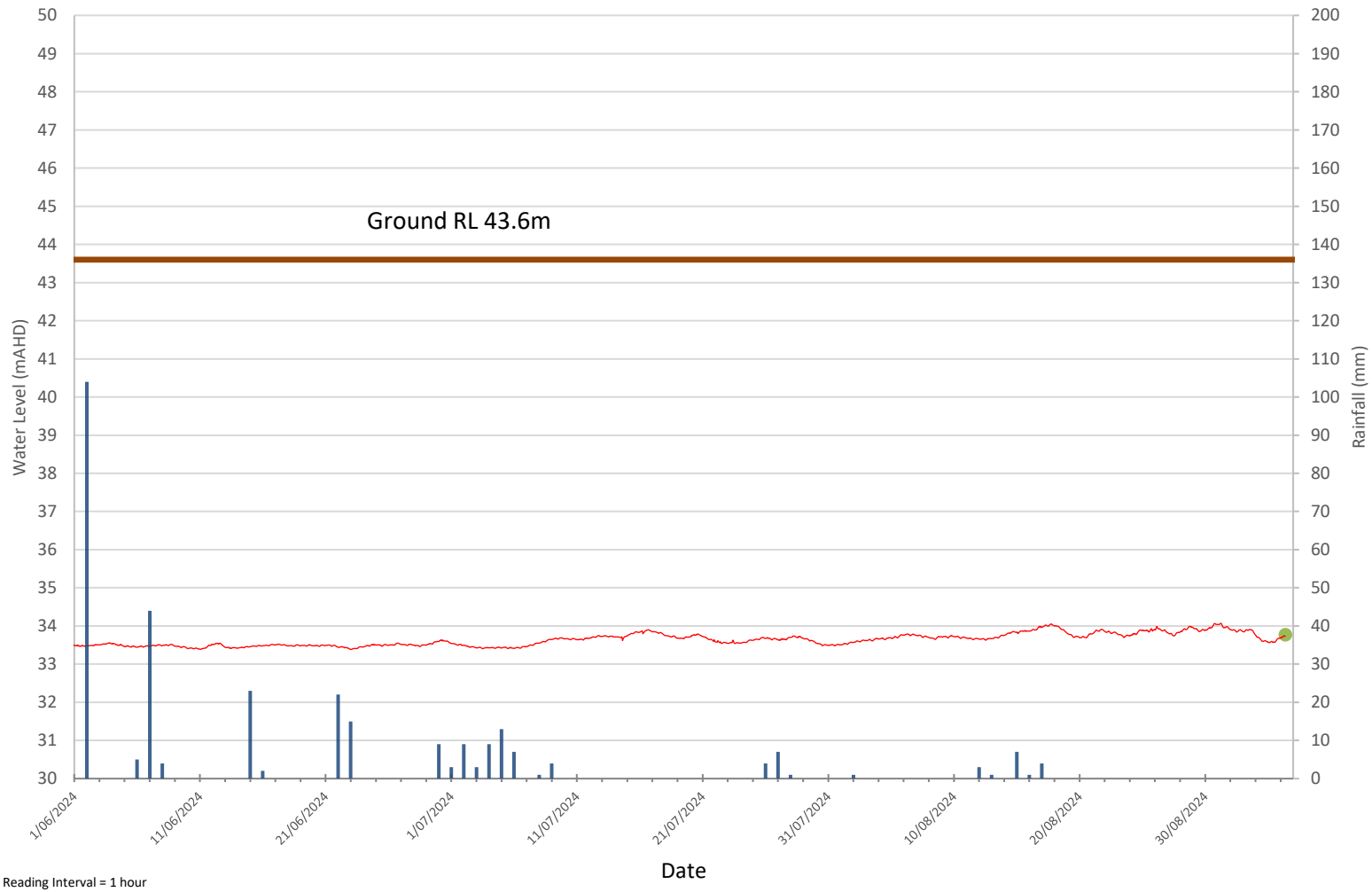
Note: Reading Interval = 1 hour

Douglas PARTNERS

Manual Levels
Water Level
Rainfall data (ST: 66213 North Ryde Golf Club)

Date:	From	Drawn:
12/09/2024	1/06/2024	RMM
Project:	**To**	**Checked:**
212194.01	5/09/2024	STE

BH5



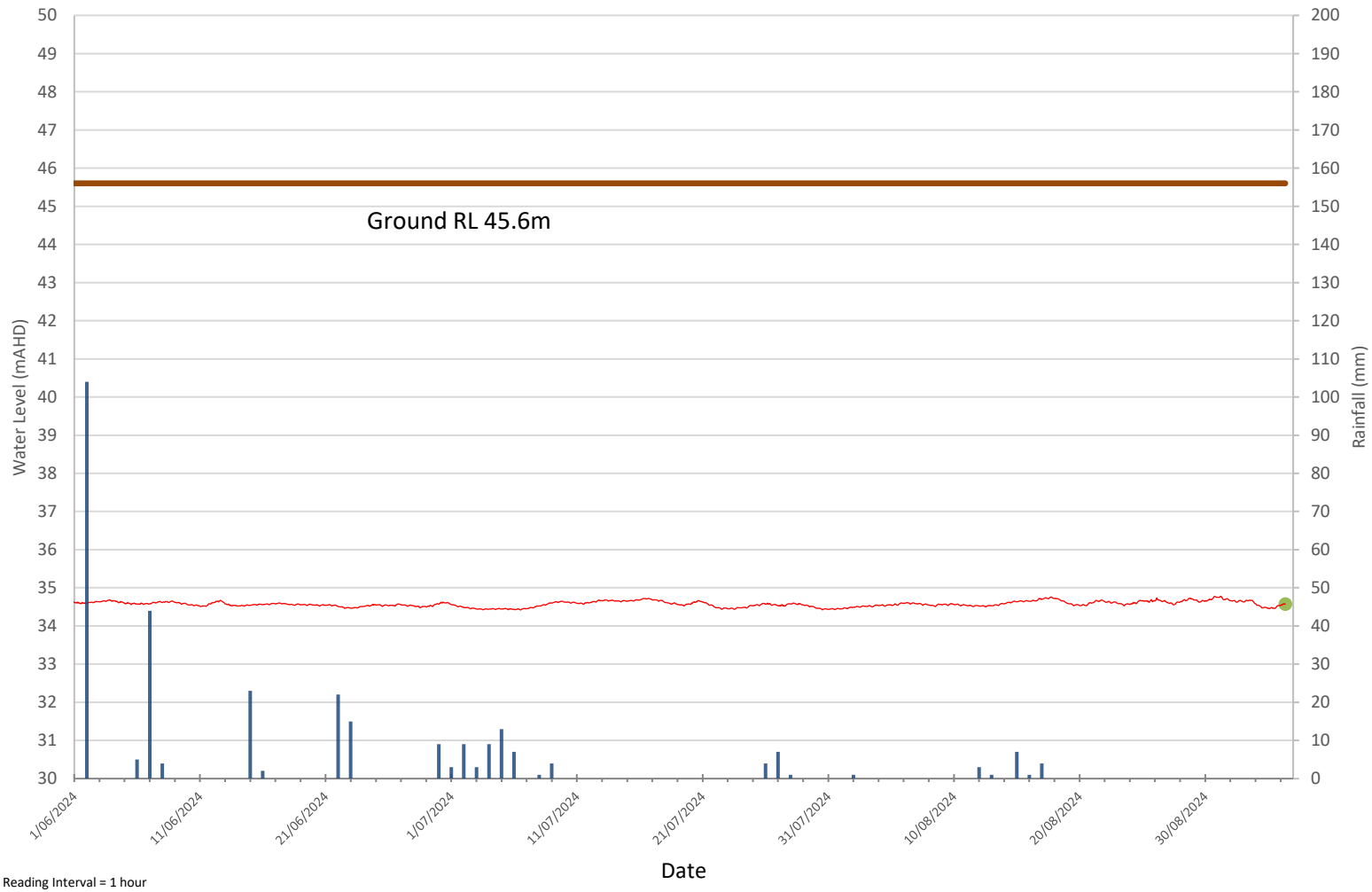
Note: Reading Interval = 1 hour

Douglas PARTNERS

Manual Levels
Water Level
Rainfall data (ST: 66213 North Ryde Golf Club)

Date:	From	Drawn:
12/09/2024	1/06/2024	RMM
Project:	**To**	**Checked:**
212194.01	5/09/2024	STE

BH6



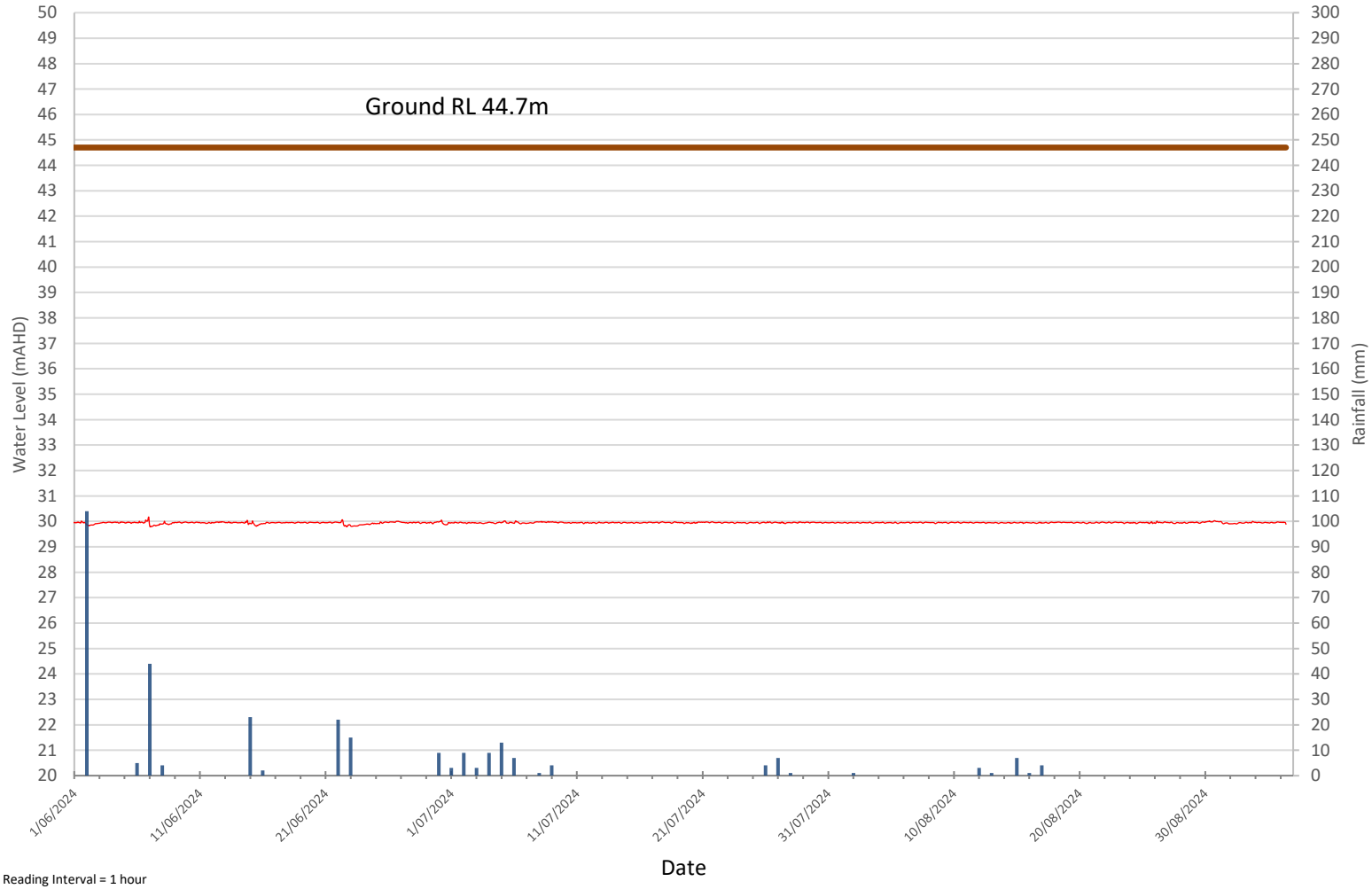
Note: Reading Interval = 1 hour

Douglas PARTNERS

Manual Levels
Water Level
Rainfall data (ST: 66213 North Ryde Golf Club)

Date:	From	Drawn:
12/09/2024	1/06/2024	RMM
Project:	**To**	**Checked:**
212194.01	5/09/2024	STE

BH2-2018

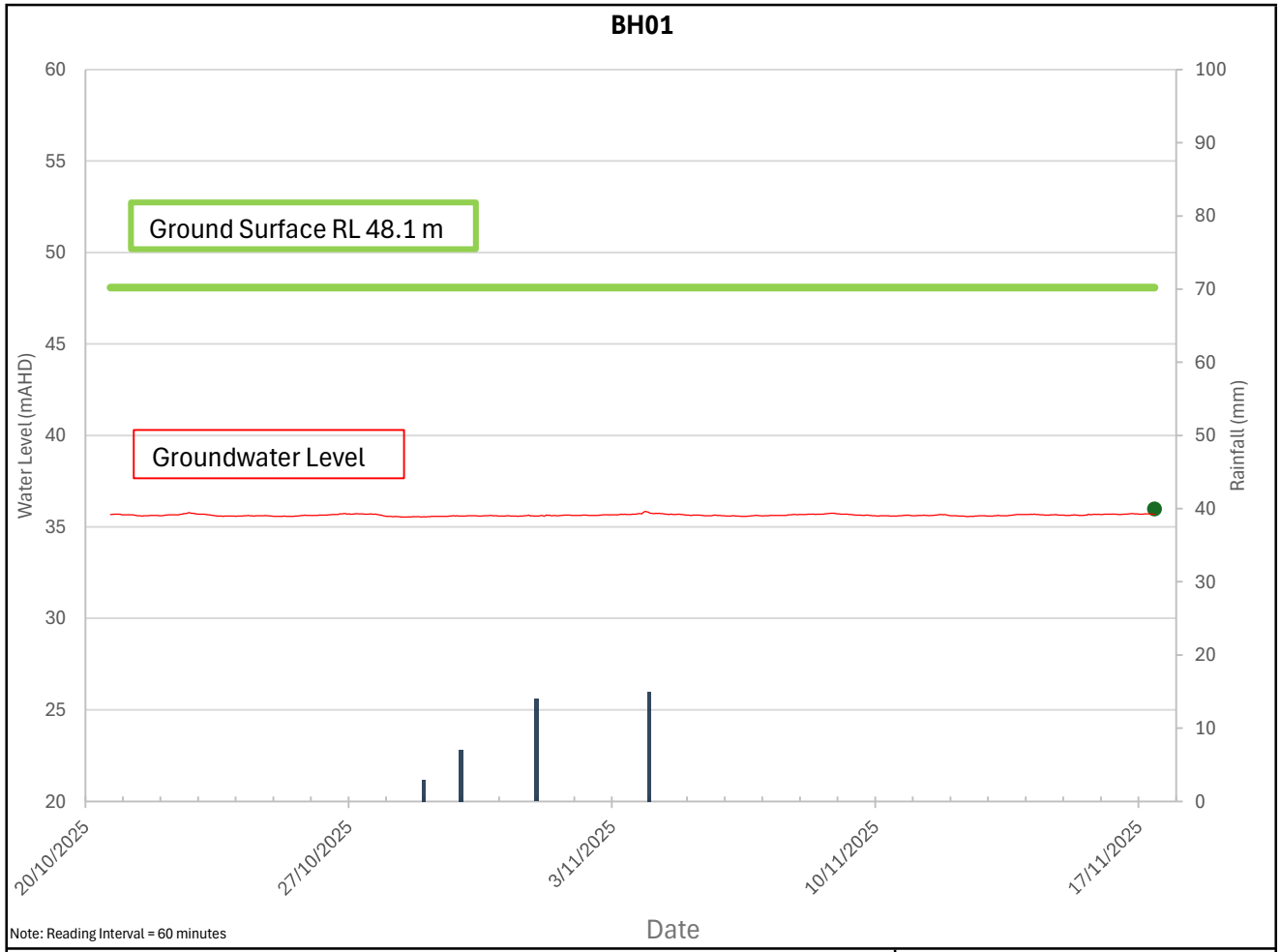


Note: Reading Interval = 1 hour

Douglas PARTNERS

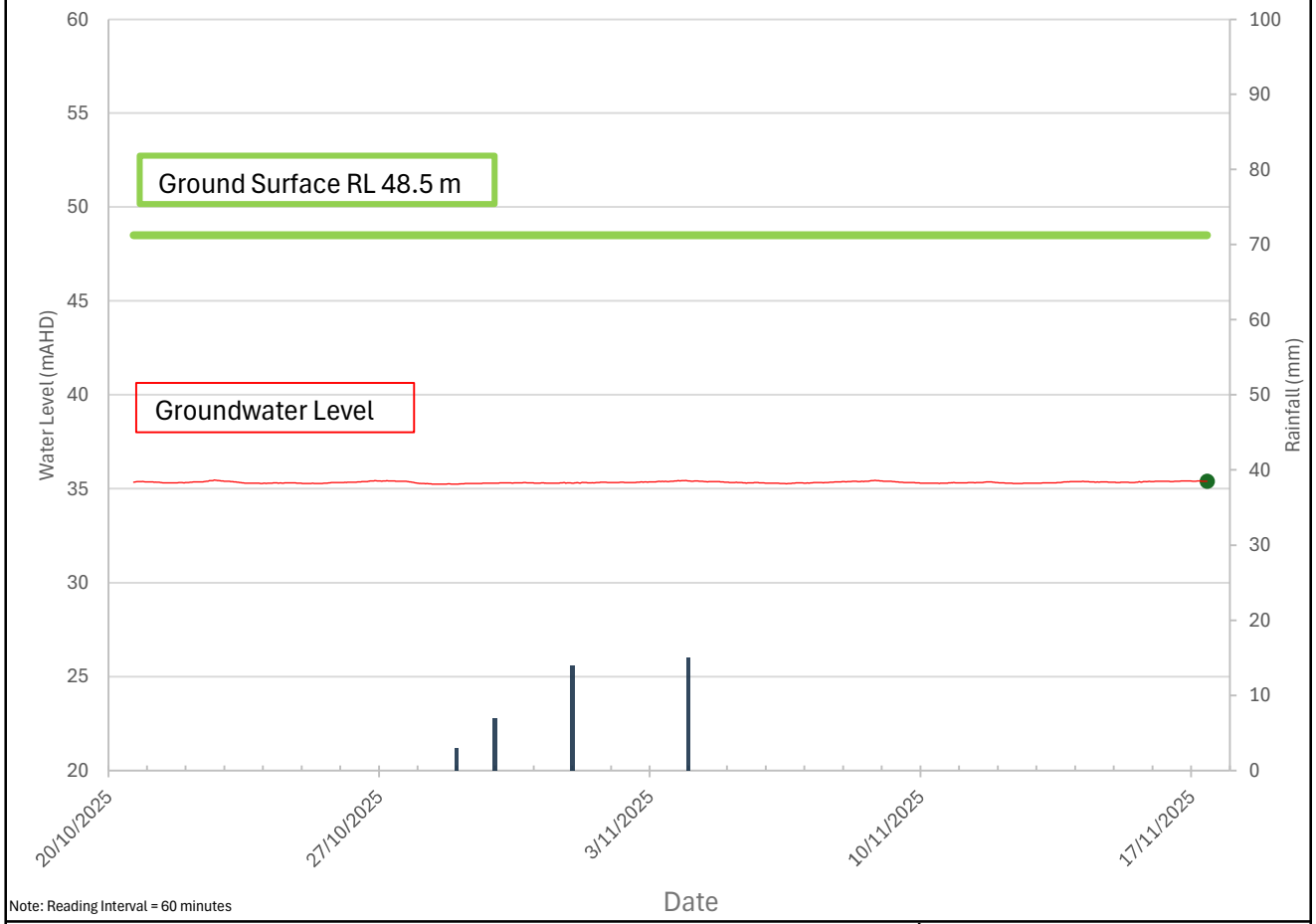
Manual Levels
Water Level
Rainfall data (ST: 66213 North Ryde Golf Club)

Date:	From	Drawn:
12/09/2024	1/06/2024	RMM
Project:	**To**	**Checked:**
212194.01	5/09/2024	STE



Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	

BH02



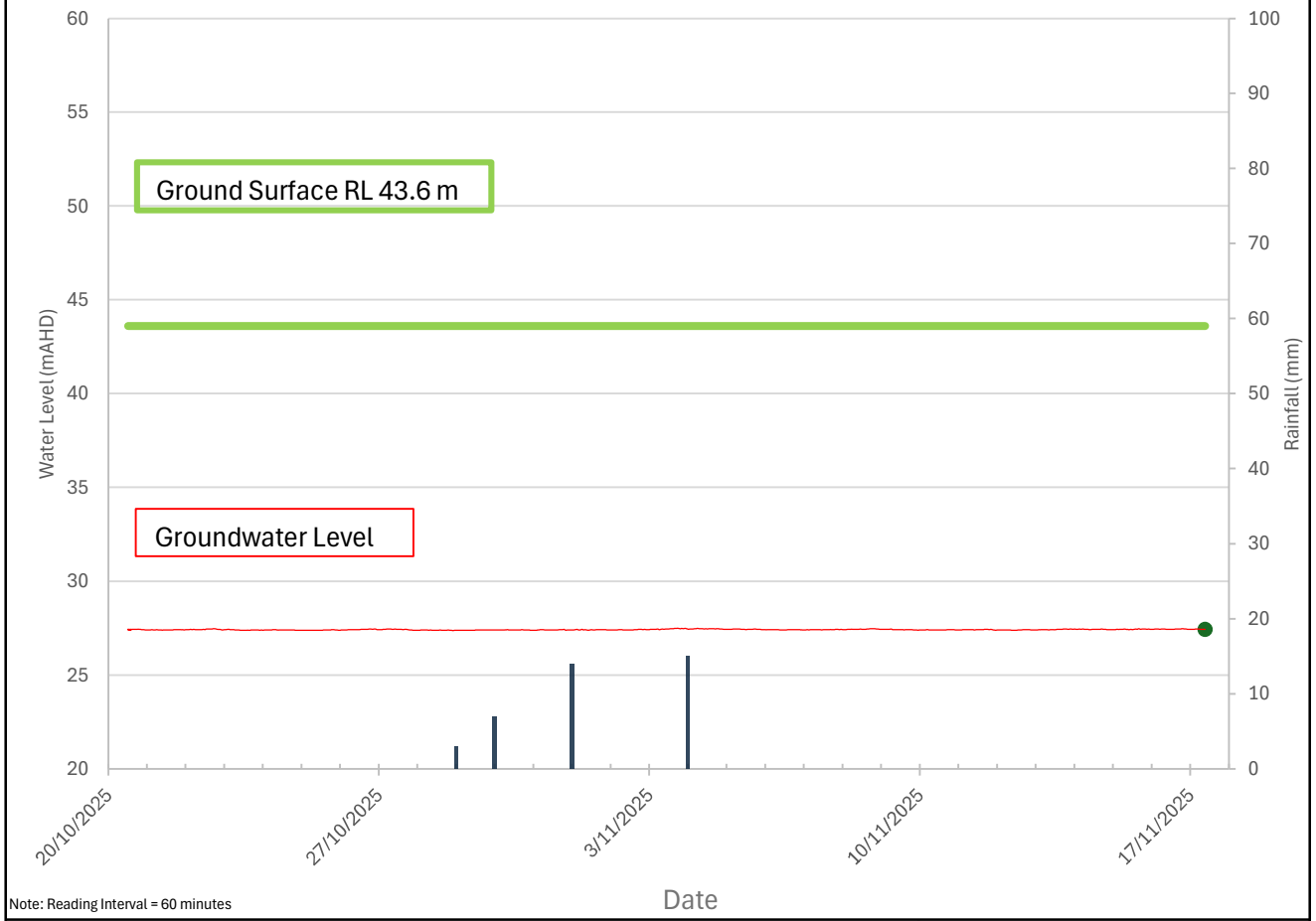
Note: Reading Interval = 60 minutes

Douglas PARTNERS

Manual Levels | Water Level | Ground Surface RL | Rainfall Data

Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	

BH05

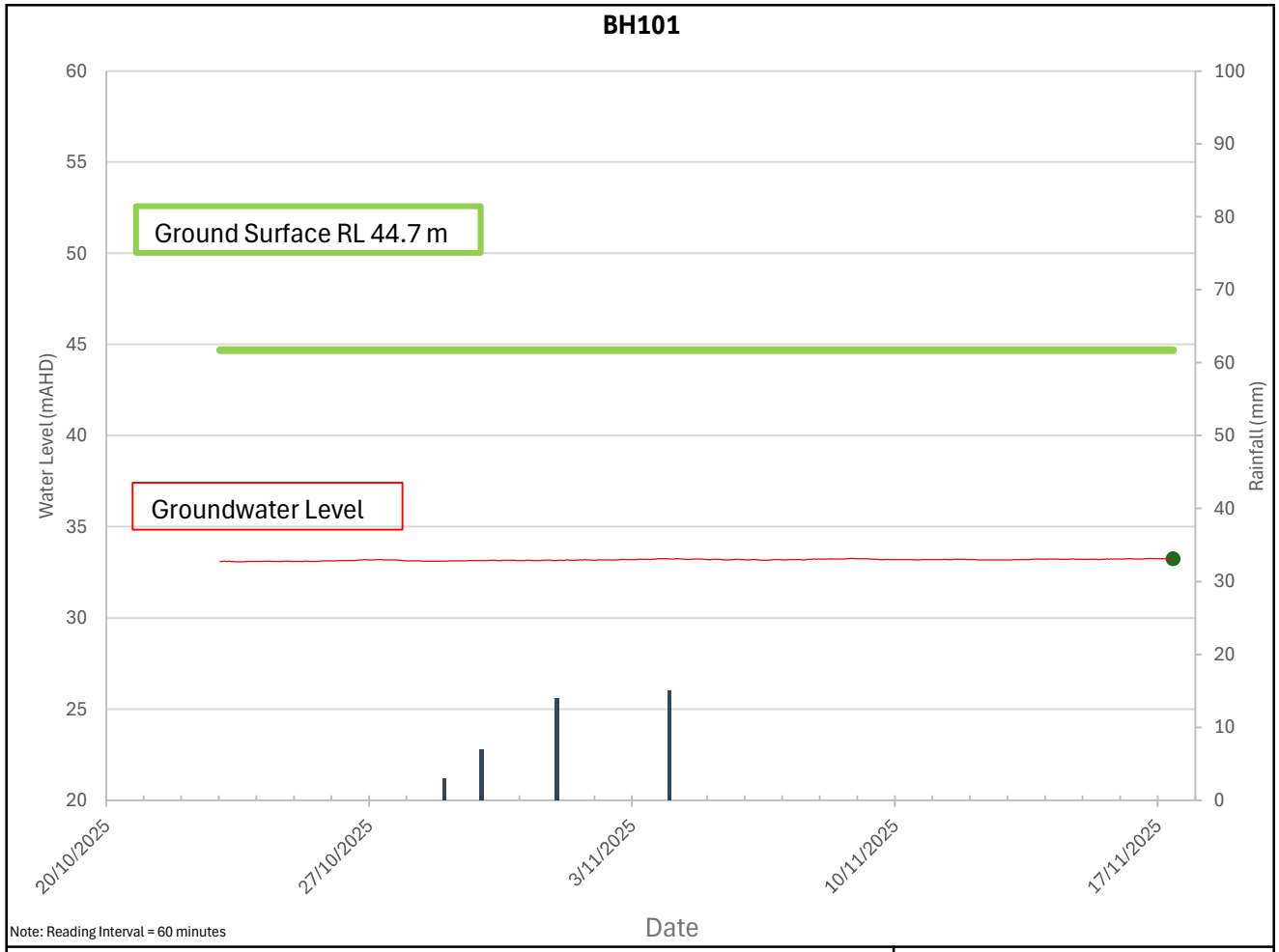


Note: Reading Interval = 60 minutes

Douglas PARTNERS

Manual Levels
Water Level
Ground Surface RL
Rainfall Data

Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	



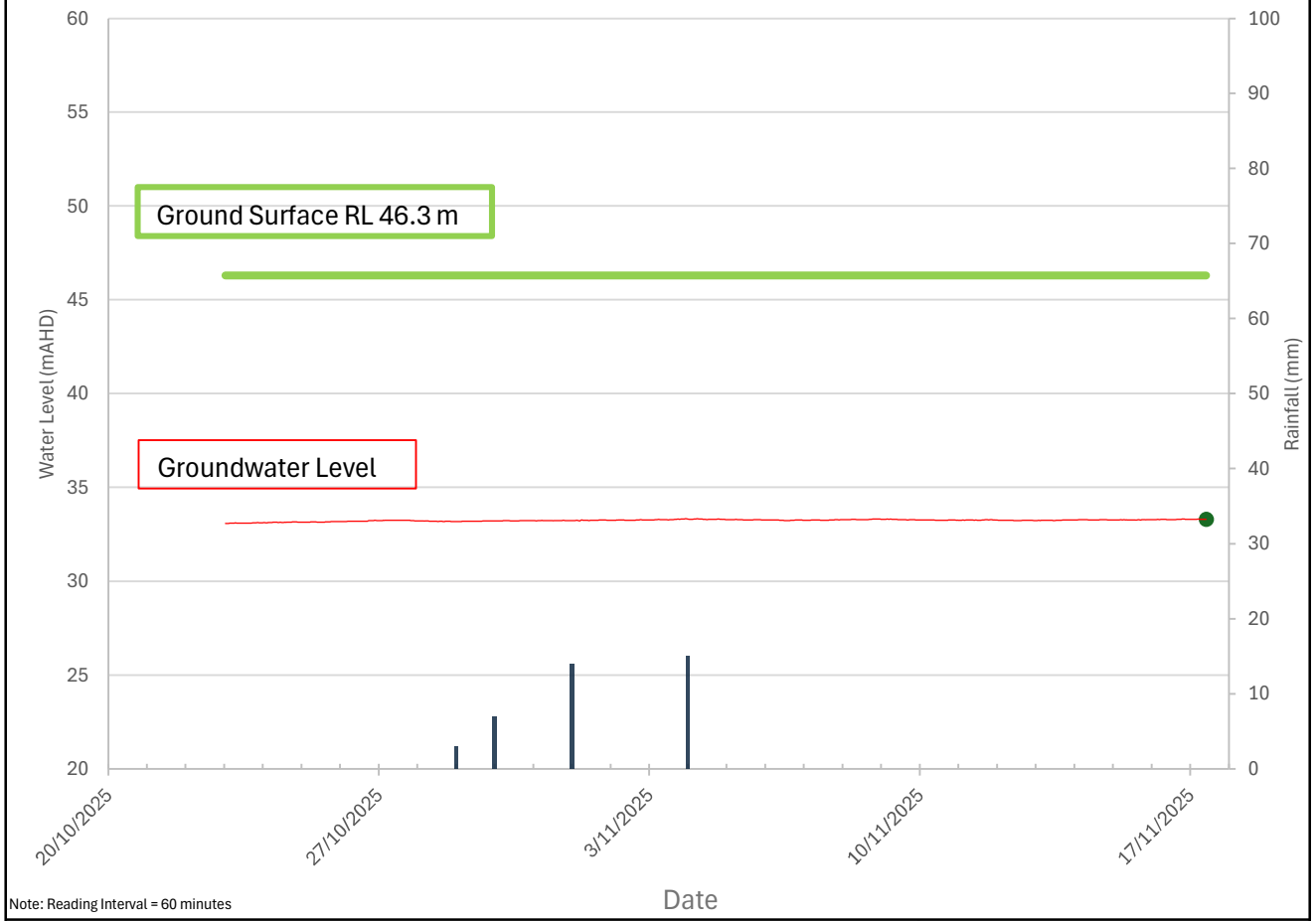
Note: Reading Interval = 60 minutes

Douglas PARTNERS

Manual Levels
Water Level
Ground Surface RL
Rainfall Data

Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	

BH102



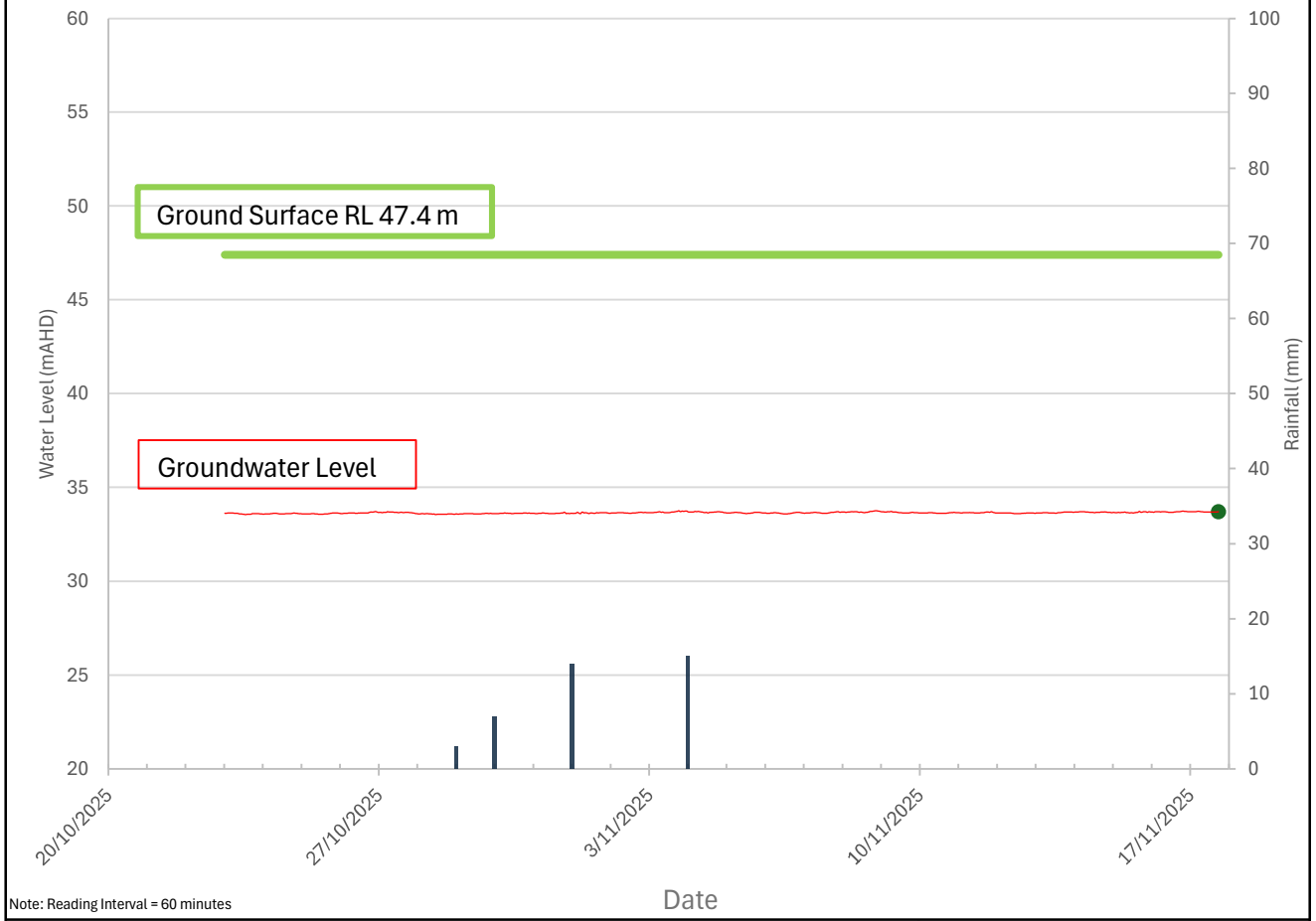
Note: Reading Interval = 60 minutes

Douglas PARTNERS

Manual Levels
Water Level
Ground Surface RL
Rainfall Data

Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	

BH103



Note: Reading Interval = 60 minutes

Douglas PARTNERS

Manual Levels
Water Level
Ground Surface RL
Rainfall Data

Date:	From	Drawn:
17/11/2025	20/10/2025	ZF
Project:	**To**	**Checked:**
222462.01	17/11/2025	

Appendix E

Hydraulic Testing Results

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

Permeability Testing - Rising or Falling Head Test Report

Client:	Legacy Property Ptd Ltd	Project No:	222462.01
Project:	Proposed Mixed-use Development	Test date:	27.05.2024
Location:	17-21 Cottonwood Crescent, Macquarie Park	Tested by:	IH

Test Location

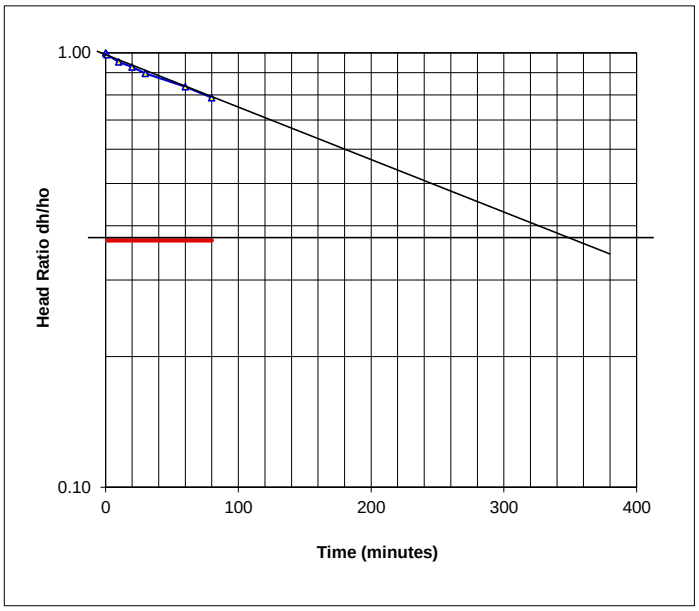
Description:	Standpipe in borehole	**Test No.**	BH1	
Material type:	Sandstone	Easting:	325791.8	m
	Rising head test	Northing	6260745.9	m
		Surface Level:	48.1	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	12.34	m
borehole diameter (2R)	76	mm	Depth to water at start of test	14.28	m
Effective Length of well screen (Le)	4.16	m	Depth of top of gravel pack	1.50	m
			Depth of base of gravel pack	16.50	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	14.28	1.94	1.000
1	14.26	1.92	0.990
10	14.19	1.85	0.954
20	14.14	1.80	0.928
30	14.08	1.74	0.897
60	13.96	1.62	0.835
80	13.87	1.53	0.789



To = 350 mins
21000 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k =** **3.9E-08** m/sec
= **3.4E-03** m/day

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

Permeability Testing - Rising or Falling Head Test Report

Client:	Legacy Property Ptd Ltd	Project No:	222462.01
Project:	Proposed Mixed-use Development	Test date:	27.05.2024
Location:	17-21 Cottonwood Crescent, Macquarie Park	Tested by:	IH

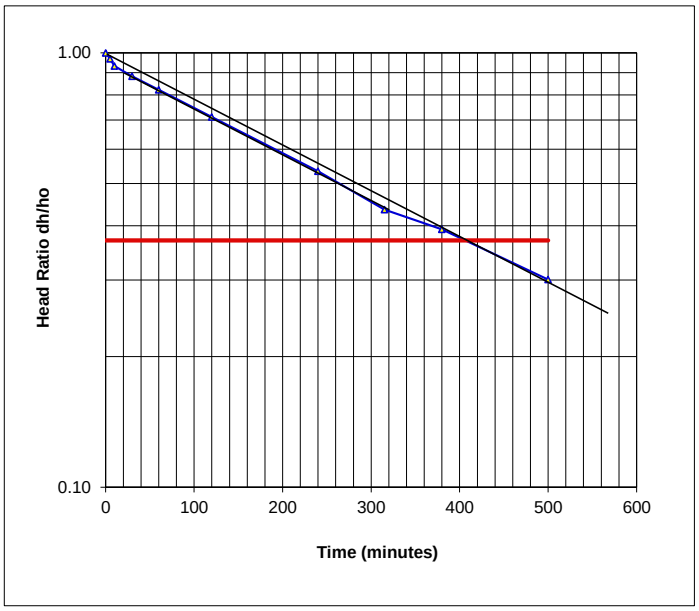
Test Location		**Test No.**	BH2	
Description:	Standpipe in borehole	Easting:	325795.0	m
Material type:	Sandstone	Northing	6260767.6	m
	Rising head test	Surface Level:	48.5	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	12.97	m
borehole diameter (2R)	76	mm	Depth to water at start of test	14.60	m
Effective Length of well screen (Le)	4.03	m	Depth of top of gravel pack	2.00	m
			Depth of base of gravel pack	17.00	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	14.60	1.63	1.000
5	14.55	1.58	0.969
10	14.49	1.52	0.933
30	14.41	1.44	0.883
60	14.31	1.34	0.822
120	14.13	1.16	0.712
240	13.84	0.87	0.534
315	13.68	0.71	0.436
380	13.61	0.64	0.393
500	13.46	0.49	0.301



To = 410 mins
24600 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k =** **3.4E-08** m/sec
= **2.9E-03** m/day

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

Permeability Testing - Rising or Falling Head Test Report

Client:	Legacy Property Ptd Ltd	Project No:	222462.01
Project:	Proposed Mixed-use Development	Test date:	27.05.2024
Location:	17-21 Cottonwood Crescent, Macquarie Park	Tested by:	IH

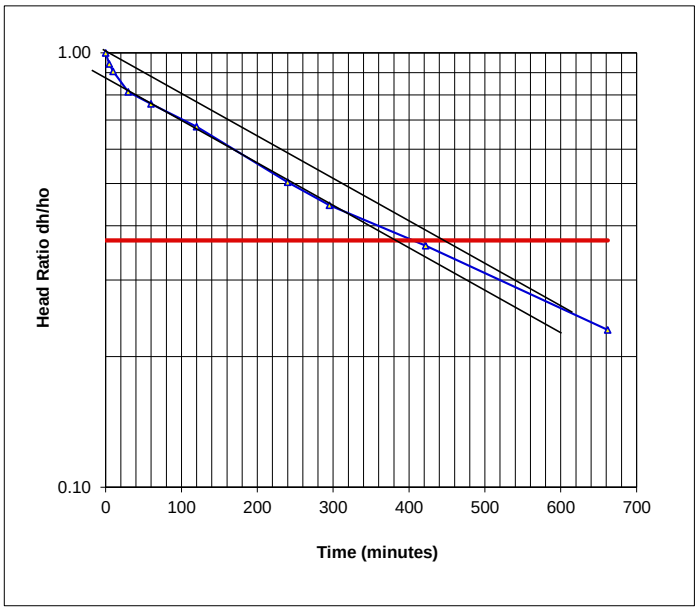
Test Location		**Test No.**	BH5	
Description:	Standpipe in borehole	Easting:	325852.0	m
Material type:	Sandstone	Northing	6260784.5	m
	Rising head test	Surface Level:	43.6	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	10.12	m
borehole diameter (2R)	76	mm	Depth to water at start of test	11.51	m
Effective Length of well screen (Le)	8.38	m	Depth of top of gravel pack	5.00	m
			Depth of base of gravel pack	18.50	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	11.51	1.39	1.000
5	11.43	1.31	0.942
10	11.38	1.26	0.906
30	11.25	1.13	0.813
60	11.18	1.06	0.763
120	11.06	0.94	0.676
240	10.82	0.70	0.504
295	10.74	0.62	0.446
422	10.62	0.50	0.360
662	10.44	0.32	0.230



To = 440 mins
26400 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k =** **1.8E-08** m/sec
= **1.5E-03** m/day

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

Permeability Testing - Rising or Falling Head Test Report

Client:	Legacy Property Ptd Ltd	Project No:	222462.01
Project:	Proposed Mixed-use Development	Test date:	27.05.2024
Location:	17-21 Cottonwood Crescent, Macquarie Park	Tested by:	IH

Test Location

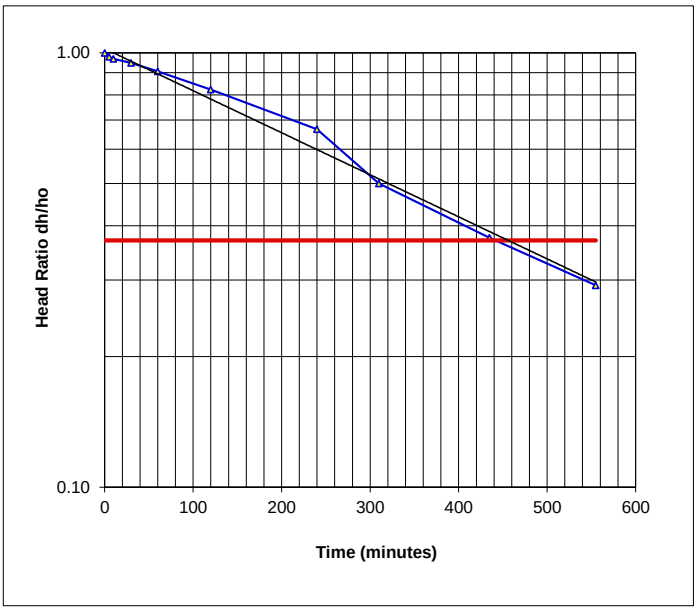
Description:	Standpipe in borehole	**Test No.**	BH6	
Material type:	Sandstone	Easting:	325833.7	m
	Rising head test	Northing	6260762.3	m
		Surface Level:	45.6	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	11.01	m
borehole diameter (2R)	76	mm	Depth to water at start of test	11.97	m
Effective Length of well screen (Le)	3.23	m	Depth of top of gravel pack	2.50	m
			Depth of base of gravel pack	14.24	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	11.97	0.96	1.000
5	11.95	0.94	0.979
10	11.94	0.93	0.969
30	11.92	0.91	0.948
60	11.88	0.87	0.906
120	11.80	0.79	0.823
240	11.65	0.64	0.667
310	11.49	0.48	0.500
435	11.37	0.36	0.375
555	11.29	0.28	0.292



To = 460 mins
27600 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k =** **3.6E-08** m/sec
= **3.1E-03** m/day

WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH101
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	12.0 - 18.0 m

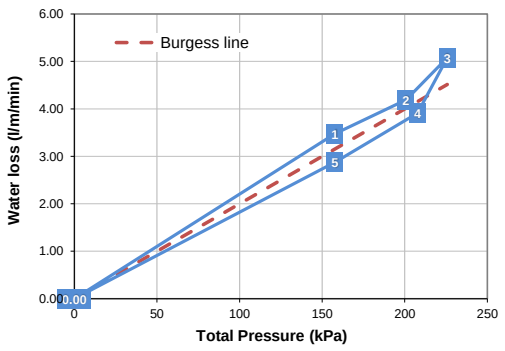
Test Details

Date:	2-Jun-25	Bottom of packer (m):	12.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	18.00	Vertical Depth to groundwater (m):	11.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
40	0	158	5	36924.5	37016.5	92.0	750.0	410.0	89.8	0.0	92.0	3.1	19.4	1.9E-06
40	0	158	5	37072.5	37179.5	107.0	750.0	380.0	97.8	0.0	107.0	3.6	22.6	2.3E-06
40	0	158	5	37223.5	37337.5	114.0	750.0	330.0	111.0	0.0	114.0	3.8	24.1	2.4E-06
90	7	201	5	37414.5	37555.5	141.0	790.0	285.0	133.4	0.0	141.0	4.7	23.4	2.3E-06
90	0	208	5	37651.5	37767.5	116.0	790.0	315.0	125.5	0.0	116.0	3.9	18.6	1.9E-06
90	0	208	5	37849.5	37969.5	120.0	790.0	300.0	129.5	0.0	120.0	4.0	19.3	1.9E-06
130	22	226	5	38100.5	38284.5	184.0	790.0	240.0	145.3	0.0	184.0	6.1	27.2	2.7E-06
130	6	242	5	38357.5	38494.5	137.0	790.0	250.0	142.7	0.0	137.0	4.6	18.9	1.9E-06
130	5	243	5	38627.5	38763.5	136.0	790.0	245.0	144.0	0.0	136.0	4.5	18.7	1.9E-06
90	0	208	5	38859.5	38975.5	116.0	790.0	280.0	134.7	0.0	116.0	3.9	18.6	1.9E-06
90	0	208	5	39060.5	39177.5	117.0	720.0	240.0	126.8	0.0	117.0	3.9	18.8	1.9E-06
90	0	208	5	39263.5	39382.5	119.0	730.0	250.0	126.8	0.0	119.0	4.0	19.1	1.9E-06
40	0	158	5	39442.5	39531.5	89.0	715.0	365.0	92.5	0.0	89.0	3.0	18.8	1.9E-06
40	0	158	5	39582.5	39667.5	85.0	725.0	400.0	85.9	0.0	85.0	2.8	18.0	1.8E-06
40	0	158	5	39694.5	39779.5	85.0	600.0	265.0	88.5	0.0	85.0	2.8	18.0	1.8E-06

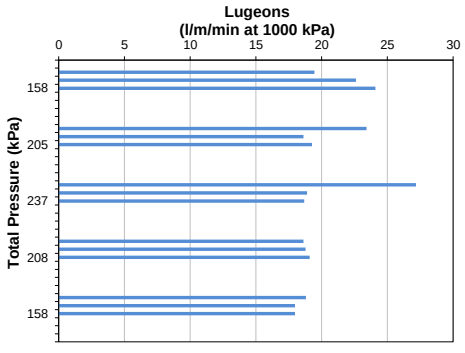
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	158	3.48	22.05
2	201	4.19	20.43
3	226	5.08	21.58
4	208	3.91	18.83
5	158	2.88	18.25

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	20
Burgess Lugeon value	20

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH101
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	24.0-30.0 m

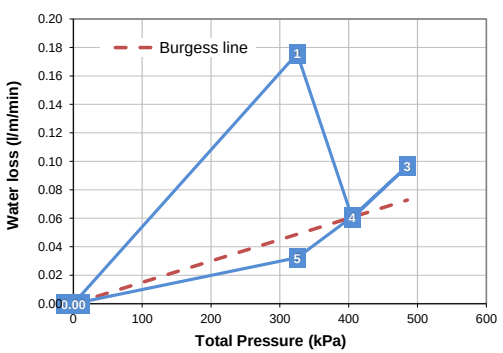
Test Details

Date:	3-Jun-25	Bottom of packer (m):	24.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	30.00	Vertical Depth to groundwater (m):	24.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
80	0	325	5	39850.5	39864.2	13.7	580.0	528.0	13.7	0.0	13.7	0.5	1.4	1.4E-07
80	0	325	5	39864.2	39864.2	0.0	528.0	522.0	1.6	0.0	1.6	0.1	0.2	1.6E-08
80	0	325	5	39864.2	39864.2	0.0	522.0	520.0	0.5	0.0	0.5	0.0	0.1	5.4E-09
160	0	405	5	39865.0	39866.6	1.6	790.0	781.0	2.4	0.0	1.6	0.1	0.1	1.3E-08
160	0	405	5	39866.6	39868.5	1.9	781.0	770.0	2.9	0.0	1.9	0.1	0.2	1.6E-08
160	0	405	5	39868.5	39870.4	1.9	770.0	760.0	2.6	0.0	1.9	0.1	0.2	1.6E-08
240	0	485	5	39871.3	39874.5	3.2	750.0	736.0	3.7	0.0	3.2	0.1	0.2	2.2E-08
240	0	485	5	39874.5	39877.3	2.8	736.0	721.0	4.0	0.0	2.8	0.1	0.2	1.9E-08
240	0	485	5	39877.3	39880.0	2.7	721.0	708.0	3.4	0.0	2.7	0.1	0.2	1.9E-08
160	0	405	5	39881.2	39883.0	1.8	705.0	696.0	2.4	0.0	1.8	0.1	0.1	1.5E-08
160	0	405	5	39883.0	39884.9	1.9	696.0	685.0	2.9	0.0	1.9	0.1	0.2	1.6E-08
160	0	405	5	39884.9	39886.7	1.8	685.0	677.0	2.1	0.0	1.8	0.1	0.1	1.5E-08
80	0	325	5	39886.7	39886.8	0.1	677.0	674.0	0.8	0.0	0.8	0.0	0.1	8.1E-09
80	0	325	5	39886.8	39886.8	0.0	674.0	670.0	1.1	0.0	1.1	0.0	0.1	1.1E-08
80	0	325	5	39886.8	39886.8	0.0	670.0	666.0	1.1	0.0	1.1	0.0	0.1	1.1E-08

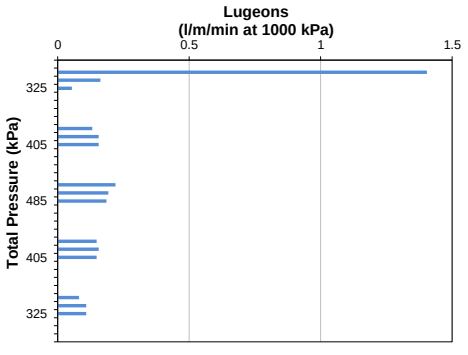
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	325	0.18	0.54
2	405	0.06	0.15
3	485	0.10	0.20
4	405	0.06	0.15
5	325	0.03	0.10

Houlsby Flow Pattern	Void Filling
Houlsby Lugeon value	<0.1
Burgess Lugeon value	0.2

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH101
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	30.0 - 36.08 m

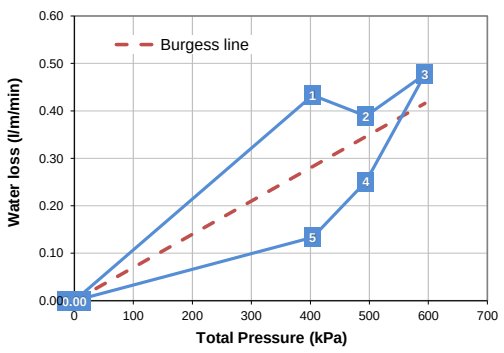
Test Details

Date:	3-Jun-25	Bottom of packer (m):	30.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	36.08	Vertical Depth to groundwater (m):	30.0	0.264
Bore inclination (deg):	90	Section length (m):	6.08	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
100	0	404	5	39946.5	39970.5	24.0	765.0	670.0	25.1	0.0	24.0	0.8	2.0	2.0E-07
100	0	404	5	39970.5	39978.5	8.0	670.0	636.0	9.0	0.0	8.0	0.3	0.7	6.5E-08
100	0	404	5	39978.5	39986.0	7.5	636.0	605.0	8.2	0.0	7.5	0.2	0.6	6.1E-08
190	0	494	5	39991.5	40003.5	12.0	585.0	536.0	12.9	0.0	12.0	0.4	0.8	8.0E-08
190	0	494	5	40003.5	40015.0	11.5	536.0	485.0	13.5	0.0	11.5	0.4	0.8	7.7E-08
190	0	494	5	40015.0	40027.0	12.0	485.0	435.0	13.2	0.0	12.0	0.4	0.8	8.0E-08
290	0	594	5	40036.5	40052.5	16.0	785.0	724.0	16.1	0.0	16.0	0.5	0.9	8.9E-08
290	0	594	5	40052.5	40066.5	14.0	724.0	667.0	15.1	0.0	14.0	0.5	0.8	7.8E-08
290	0	594	5	40066.5	40080.0	13.5	667.0	615.0	13.7	0.0	13.5	0.4	0.7	7.5E-08
190	0	494	5	40082.1	40089.4	7.3	610.0	585.0	6.6	0.0	7.3	0.2	0.5	4.9E-08
190	0	494	5	40089.4	40097.0	7.6	585.0	556.0	7.7	0.0	7.6	0.2	0.5	5.1E-08
190	0	494	5	40097.0	40105.0	8.0	556.0	525.0	8.2	0.0	8.0	0.3	0.5	5.3E-08
100	0	404	5	40105.0	40107.5	2.5	525.0	518.0	1.8	0.0	2.5	0.1	0.2	2.0E-08
100	0	404	5	40107.5	40112.2	4.7	518.0	500.0	4.8	0.0	4.7	0.2	0.4	3.8E-08
100	0	404	5	40112.2	40117.2	5.0	500.0	478.0	5.8	0.0	5.0	0.2	0.4	4.1E-08

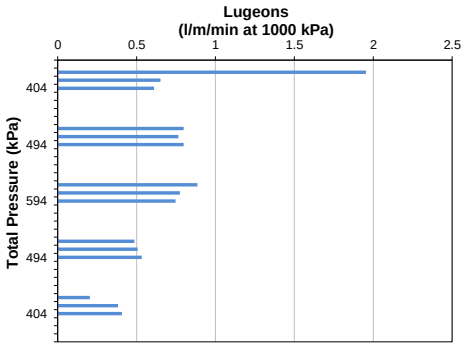
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	404	0.43	1.07
2	494	0.39	0.79
3	594	0.48	0.80
4	494	0.25	0.51
5	404	0.13	0.33

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.7
Burgess Lugeon value	0.7

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH101
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	36.0 - 42.12 m

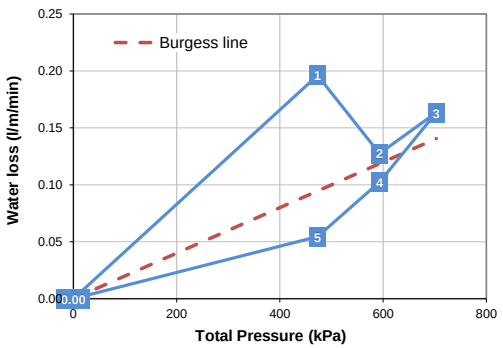
Test Details

Date:	4-Jun-25	Bottom of packer (m):	36.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	42.12	Vertical Depth to groundwater (m):	36.0	0.264
Bore inclination (deg):	90	Section length (m):	6.12	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
110	0	473	5	40146.5	40164.0	17.5	700.0	645.0	14.5	0.0	17.5	0.6	1.2	1.2E-07
110	0	473	5	40164.0	40166.5	2.5	645.0	500.0	38.3	0.0	2.5	0.1	0.2	1.7E-08
110	0	473	5	40166.5	40168.5	2.0	500.0	492.0	2.1	0.0	2.0	0.1	0.1	1.4E-08
110	0	473	5	40168.5	40170.5	2.0	492.0	483.0	2.4	0.0	2.0	0.1	0.1	1.4E-08
230	0	593	5	40171.5	40175.5	4.0	750.0	737.0	3.4	0.0	4.0	0.1	0.2	2.2E-08
230	0	593	5	40175.5	40179.5	4.0	737.0	722.0	4.0	0.0	4.0	0.1	0.2	2.2E-08
230	0	593	5	40179.5	40183.2	3.7	722.0	705.0	4.5	0.0	3.7	0.1	0.2	2.0E-08
340	0	703	5	40185.0	40190.0	5.0	699.0	673.0	6.9	0.0	5.0	0.2	0.2	2.3E-08
340	0	703	5	40190.0	40195.0	5.0	673.0	653.0	5.3	0.0	5.0	0.2	0.2	2.3E-08
340	0	703	5	40195.0	40200.0	5.0	653.0	634.0	5.0	0.0	5.0	0.2	0.2	2.3E-08
230	0	593	5	40201.9	40205.0	3.1	630.0	621.0	2.4	0.0	3.1	0.1	0.2	1.7E-08
230	0	593	5	40205.0	40208.2	3.2	621.0	608.0	3.4	0.0	3.2	0.1	0.2	1.8E-08
230	0	593	5	40208.2	40211.3	3.1	608.0	594.0	3.7	0.0	3.1	0.1	0.2	1.7E-08
110	0	473	5	40213.0	40214.6	1.6	592.0	582.0	2.6	0.0	1.6	0.1	0.1	1.1E-08
110	0	473	5	40214.6	40216.3	1.7	582.0	574.0	2.1	0.0	1.7	0.1	0.1	1.2E-08
110	0	473	5	40216.3	40218.0	1.7	574.0	567.0	1.8	0.0	1.7	0.1	0.1	1.2E-08

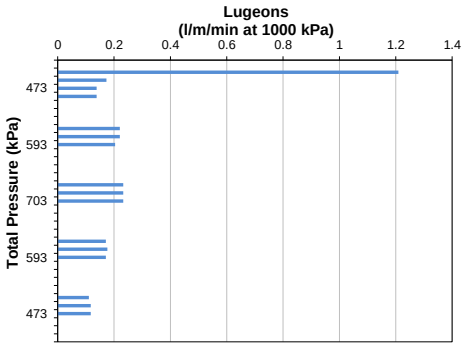
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	473	0.20	0.41
2	593	0.13	0.21
3	703	0.16	0.23
4	593	0.10	0.17
5	473	0.05	0.12

Houlsby Flow Pattern	Void Filling
Houlsby Lugeon value	0.1
Burgess Lugeon value	0.2

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH102
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	13.0 - 19.0 m

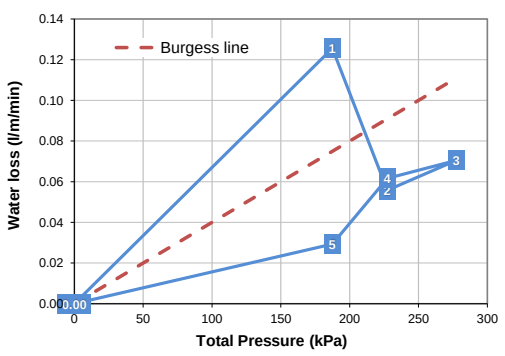
Test Details

Date:	14-Apr-25	Bottom of packer (m):	13.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	19.00	Vertical Depth to groundwater (m):	13.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
50	0	187	5	36573.1	36579.9	6.8	674.0	635.0	10.3	0.0	6.8	0.2	1.2	1.2E-07
50	0	187	5	36579.9	36585.0	5.1	635.0	616.0	5.0	0.0	5.1	0.2	0.9	9.1E-08
50	0	187	5	36585.0	36585.0	0.0	616.0	610.0	1.6	0.0	1.6	0.1	0.3	2.8E-08
50	0	187	5	36585.0	36585.0	0.0	610.0	604.0	1.6	0.0	1.6	0.1	0.3	2.8E-08
90	0	227	5	36585.0	36585.0	0.0	595.0	588.0	1.8	0.0	1.8	0.1	0.3	2.7E-08
90	0	227	5	36585.0	36585.0	0.0	588.0	582.0	1.6	0.0	1.6	0.1	0.2	2.3E-08
90	0	227	5	36585.0	36585.0	0.0	582.0	576.0	1.6	0.0	1.6	0.1	0.2	2.3E-08
140	0	277	5	36585.0	36585.0	0.0	565.0	555.0	2.6	0.0	2.6	0.1	0.3	3.2E-08
140	0	277	5	36585.0	36585.0	0.0	555.0	548.0	1.8	0.0	1.8	0.1	0.2	2.2E-08
140	0	277	5	36585.0	36585.0	0.0	548.0	541.0	1.8	0.0	1.8	0.1	0.2	2.2E-08
90	0	227	5	36585.1	36585.1	0.0	537.0	530.0	1.8	0.0	1.8	0.1	0.3	2.7E-08
90	0	227	5	36585.1	36585.1	0.0	530.0	523.0	1.8	0.0	1.8	0.1	0.3	2.7E-08
90	0	227	5	36585.1	36585.1	0.0	523.0	516.0	1.8	0.0	1.8	0.1	0.3	2.7E-08
50	0	187	5	36585.1	36585.1	0.0	515.0	513.0	0.5	0.0	0.5	0.0	0.1	9.4E-09
50	0	187	5	36585.1	36585.1	0.0	513.0	509.0	1.1	0.0	1.1	0.0	0.2	1.9E-08
50	0	187	5	36585.1	36585.1	0.0	509.0	505.0	1.1	0.0	1.1	0.0	0.2	1.9E-08

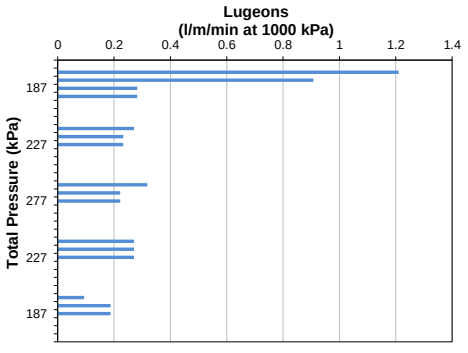
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	187	0.13	0.67
2	227	0.06	0.25
3	277	0.07	0.25
4	227	0.06	0.27
5	187	0.03	0.16

Houlsby Flow Pattern	Void Filling
Houlsby Lugeon value	0.2
Burgess Lugeon value	0.4

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH102
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	21.0 - 27.0 m

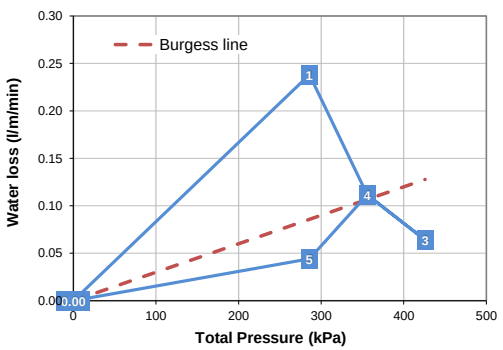
Test Details

Date:	15-Apr-25	Bottom of packer (m):	21.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	27.00	Vertical Depth to groundwater (m):	21.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
70	0	286	5	36634.7	36656.7	22.0	760.0	658.0	26.9	0.0	22.0	0.7	2.6	2.6E-07
70	0	286	5	36656.7	36659.1	2.4	658.0	634.0	6.3	0.0	2.4	0.1	0.3	2.8E-08
70	0	286	5	36659.1	36659.1	0.0	634.0	626.0	2.1	0.0	2.1	0.1	0.2	2.5E-08
70	0	286	5	36659.1	36659.1	0.0	626.0	618.0	2.1	0.0	2.1	0.1	0.2	2.5E-08
140	0	356	5	36659.2	36659.2	0.0	765.0	750.0	4.0	0.0	4.0	0.1	0.4	3.7E-08
140	0	356	5	36659.2	36659.2	0.0	750.0	739.0	2.9	0.0	2.9	0.1	0.3	2.7E-08
140	0	356	5	36659.2	36659.2	0.0	739.0	727.0	3.2	0.0	3.2	0.1	0.3	3.0E-08
210	0	426	5	36660.0	36661.5	1.5	712.0	695.0	4.5	0.0	1.5	0.1	0.1	1.2E-08
210	0	426	5	36661.5	36663.3	1.8	695.0	681.0	3.7	0.0	1.8	0.1	0.1	1.4E-08
210	0	426	5	36663.3	36665.3	2.0	681.0	662.0	5.0	0.0	2.0	0.1	0.2	1.6E-08
210	0	426	5	36665.3	36667.5	2.2	662.0	644.0	4.8	0.0	2.2	0.1	0.2	1.7E-08
210	0	426	5	36667.5	36669.6	2.1	644.0	625.0	5.0	0.0	2.1	0.1	0.2	1.6E-08
140	0	356	5	36669.9	36670.0	0.1	621.0	608.0	3.4	0.0	3.4	0.1	0.3	3.2E-08
140	0	356	5	36670.0	36670.1	0.1	608.0	595.0	3.4	0.0	3.4	0.1	0.3	3.2E-08
140	0	356	5	36670.1	36670.2	0.1	595.0	583.0	3.2	0.0	3.2	0.1	0.3	3.0E-08
70	0	286	5	36670.2	36670.2	0.0	582.0	577.0	1.3	0.0	1.3	0.0	0.2	1.5E-08
70	0	286	5	36670.2	36670.2	0.0	577.0	572.0	1.3	0.0	1.3	0.0	0.2	1.5E-08
70	0	286	5	36670.2	36670.2	0.0	572.0	567.0	1.3	0.0	1.3	0.0	0.2	1.5E-08

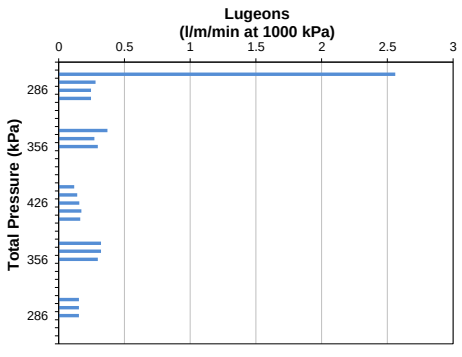
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	286	0.24	0.83
2	356	0.11	0.31
3	426	0.06	0.15
4	356	0.11	0.31
5	286	0.04	0.15

Houlsby Flow Pattern	Void Filling
Houlsby Lugeon value	0.2
Burgess Lugeon value	0.3

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH102
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	33.0 - 39.0 m

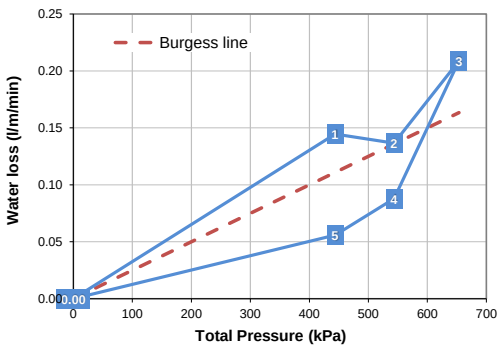
Test Details

Date:	15-Apr-25	Bottom of packer (m):	33.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	39.00	Vertical Depth to groundwater (m):	33.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
110	0	444	5	36712.6	36719.0	6.4	715.0	686.0	7.7	0.0	6.4	0.2	0.5	4.8E-08
110	0	444	5	36719.0	36719.2	0.2	686.0	674.0	3.2	0.0	3.2	0.1	0.2	2.4E-08
110	0	444	5	36719.2	36719.4	0.2	674.0	661.0	3.4	0.0	3.4	0.1	0.3	2.6E-08
210	0	544	5	36722.0	36726.4	4.4	644.0	620.0	6.3	0.0	4.4	0.1	0.3	2.7E-08
210	0	544	5	36726.4	36730.4	4.0	620.0	559.0	16.1	0.0	4.0	0.1	0.2	2.5E-08
210	0	544	5	36730.4	36734.3	3.9	559.0	581.0	5.8	0.0	3.9	0.1	0.2	2.4E-08
320	0	654	5	36738.5	36745.4	6.9	564.0	535.0	7.7	0.0	6.9	0.2	0.4	3.5E-08
320	0	654	5	36745.4	36751.4	6.0	535.0	507.0	7.4	0.0	6.0	0.2	0.3	3.1E-08
320	0	654	5	36751.4	36757.3	5.9	507.0	490.0	4.5	0.0	5.9	0.2	0.3	3.0E-08
210	0	544	5	36756.3	36758.6	2.3	488.0	476.0	3.2	0.0	2.3	0.1	0.1	1.4E-08
210	0	544	5	36758.6	36761.3	2.7	476.0	464.0	3.2	0.0	2.7	0.1	0.2	1.7E-08
210	0	544	5	36761.3	36764.2	2.9	464.0	450.0	3.7	0.0	2.9	0.1	0.2	1.8E-08
110	0	444	5	36763.4	36763.4	0.0	453.0	446.0	1.8	0.0	1.8	0.1	0.1	1.4E-08
110	0	444	5	36763.4	36763.4	0.0	446.0	440.0	1.6	0.0	1.6	0.1	0.1	1.2E-08
110	0	444	5	36763.4	36763.4	0.0	440.0	434.0	1.6	0.0	1.6	0.1	0.1	1.2E-08

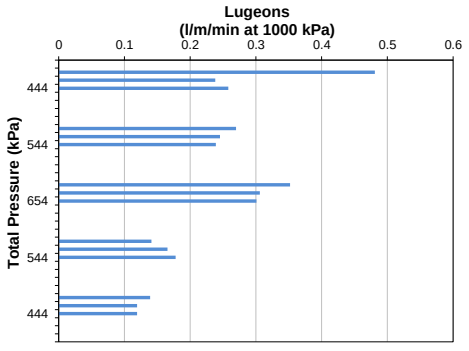
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	444	0.14	0.33
2	544	0.14	0.25
3	654	0.21	0.32
4	544	0.09	0.16
5	444	0.06	0.13

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.2
Burgess Lugeon value	0.3

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH102
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	38.0 - 44.0 m

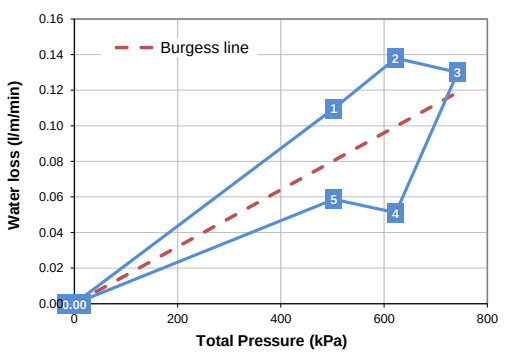
Test Details

Date:	16-Apr-25	Bottom of packer (m):	38.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	44.00	Vertical Depth to groundwater (m):	38.0	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
120	0	503	5	36783.3	36790.0	6.7	690.0	657.0	8.7	0.0	6.7	0.2	0.4	4.4E-08
120	0	503	5	36790.0	36790.0	0.0	657.0	651.0	1.6	0.0	1.6	0.1	0.1	1.1E-08
120	0	503	5	36790.0	36790.0	0.0	651.0	645.0	1.6	0.0	1.6	0.1	0.1	1.1E-08
240	0	623	5	36790.3	36790.9	0.6	632.0	616.0	4.2	0.0	4.2	0.1	0.2	2.3E-08
240	0	623	5	36790.9	36791.6	0.7	616.0	600.0	4.2	0.0	4.2	0.1	0.2	2.3E-08
240	0	623	5	36791.6	36792.2	0.6	600.0	585.0	4.0	0.0	4.0	0.1	0.2	2.1E-08
360	0	743	5	36793.3	36797.2	3.9	576.0	554.0	5.8	0.0	3.9	0.1	0.2	1.8E-08
360	0	743	5	36797.2	36801.2	4.0	554.0	535.0	5.0	0.0	4.0	0.1	0.2	1.8E-08
360	0	743	5	36801.2	36805.0	3.8	535.0	516.0	5.0	0.0	3.8	0.1	0.2	1.7E-08
240	0	623	5	36806.1	36807.8	1.7	513.0	498.0	4.0	0.0	1.7	0.1	0.1	9.1E-09
240	0	623	5	36807.8	36809.2	1.4	498.0	482.0	4.2	0.0	1.4	0.0	0.1	7.5E-09
240	0	623	5	36809.2	36810.7	1.5	482.0	469.0	3.4	0.0	1.5	0.1	0.1	8.0E-09
120	0	503	5	36811.1	36811.1	0.0	467.0	465.0	0.5	0.0	0.5	0.0	0.0	3.5E-09
120	0	503	5	36811.1	36811.1	0.0	465.0	456.0	2.4	0.0	2.4	0.1	0.2	1.6E-08
120	0	503	5	36811.1	36811.1	0.0	456.0	447.0	2.4	0.0	2.4	0.1	0.2	1.6E-08

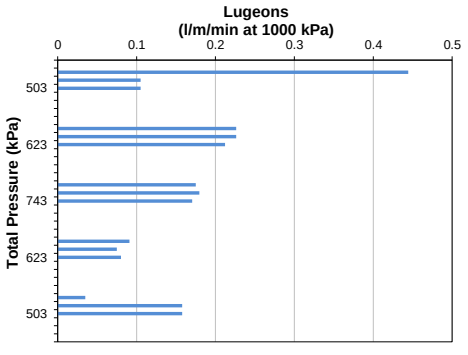
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	503	0.11	0.22
2	623	0.14	0.22
3	743	0.13	0.18
4	623	0.05	0.08
5	503	0.06	0.12

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.2
Burgess Lugeon value	0.2

Calculated: SA
Checked: RMM
Date: 8-Jul-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH103
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	14.00 - 20.17m

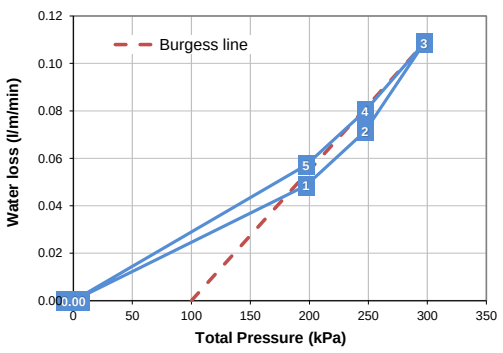
Test Details

Date:	9-Apr-25	Bottom of packer (m):	14.00	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	20.17	Vertical Depth to groundwater (m):	14.0	0.264
Bore inclination (deg):	90	Section length (m):	6.17	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
50	0	197	5	36070.6	36070.6	0.0	755.0	750.0	1.3	0.0	1.3	0.0	0.2	2.2E-08
50	0	197	5	36070.6	36070.6	0.0	750.0	746.0	1.1	0.0	1.1	0.0	0.2	1.7E-08
50	0	197	5	36070.6	36070.6	0.0	746.0	738.0	2.1	0.0	2.1	0.1	0.3	3.5E-08
100	0	247	5	36070.6	36070.6	0.0	720.0	710.0	2.6	0.0	2.6	0.1	0.3	3.5E-08
100	0	247	5	36070.6	36070.6	0.0	710.0	700.0	2.6	0.0	2.6	0.1	0.3	3.5E-08
100	0	247	5	36070.6	36070.6	0.0	700.0	695.0	1.3	0.0	1.3	0.0	0.2	1.7E-08
150	0	297	5	36070.7	36070.7	0.0	678.0	667.0	2.9	0.0	2.9	0.1	0.3	3.2E-08
150	0	297	5	36070.7	36070.7	0.0	667.0	653.0	3.7	0.0	3.7	0.1	0.4	4.0E-08
150	0	297	5	36070.7	36070.7	0.0	653.0	640.0	3.4	0.0	3.4	0.1	0.4	3.7E-08
100	0	247	5	36070.7	36070.7	0.0	639.0	629.0	2.6	0.0	2.6	0.1	0.3	3.5E-08
100	0	247	5	36070.7	36070.7	0.0	629.0	620.0	2.4	0.0	2.4	0.1	0.3	3.1E-08
100	0	247	5	36070.7	36070.7	0.0	620.0	611.0	2.4	0.0	2.4	0.1	0.3	3.1E-08
50	0	197	5	36070.7	36070.7	0.0	611.0	606.0	1.3	0.0	1.3	0.0	0.2	2.2E-08
50	0	197	5	36070.7	36070.7	0.0	606.0	597.0	2.4	0.0	2.4	0.1	0.4	3.9E-08
50	0	197	5	36070.7	36070.7	0.0	597.0	591.0	1.6	0.0	1.6	0.1	0.3	2.6E-08

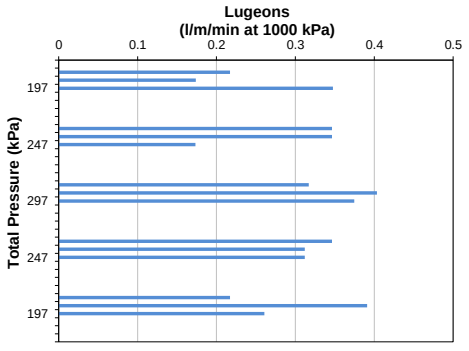
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	197	0.05	0.25
2	247	0.07	0.29
3	297	0.11	0.37
4	247	0.08	0.32
5	197	0.06	0.29

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.3
Burgess Lugeon value	0.6

Calculated: SA
Checked: JDB
Date: 16-Apr-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH103
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	21.20 - 27.20m

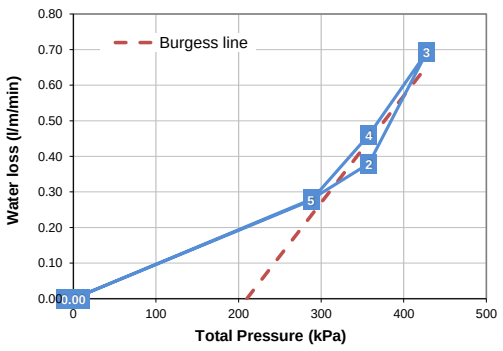
Test Details

Date:	9-Apr-25	Bottom of packer (m):	21.20	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	27.20	Vertical Depth to groundwater (m):	21.2	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
70	0	288	5	36131.2	36141.2	10.0	685.0	655.0	7.9	0.0	10.0	0.3	1.2	1.2E-07
70	0	288	5	36141.2	36149.8	8.6	655.0	620.0	9.2	0.0	8.6	0.3	1.0	1.0E-07
70	0	288	5	36149.8	36158.2	8.4	620.0	582.0	10.0	0.0	8.4	0.3	1.0	9.7E-08
70	0	288	5	36158.2	36165.6	7.4	582.0	550.0	8.5	0.0	7.4	0.2	0.9	8.6E-08
70	0	288	5	36165.6	36173.1	7.5	550.0	520.0	7.9	0.0	7.5	0.3	0.9	8.7E-08
140	0	358	5	36177.2	36186.4	9.2	-	714.0		0.0	9.2	0.3	0.9	8.5E-08
140	0	358	5	36186.4	36197.9	11.5	714.0	662.0	13.7	0.0	11.5	0.4	1.1	1.1E-07
140	0	358	5	36197.9	36210.8	12.9	662.0	605.0	15.1	0.0	12.9	0.4	1.2	1.2E-07
140	0	358	5	36210.8	36222.8	12.0	605.0	550.0	14.5	0.0	12.0	0.4	1.1	1.1E-07
210	0	428	5	36232.2	36252.6	20.4	-	703.0		0.0	20.4	0.7	1.6	1.6E-07
210	0	428	5	36252.6	36274.4	21.8	703.0	623.0	21.1	0.0	21.8	0.7	1.7	1.7E-07
210	0	428	5	36274.4	36294.6	20.2	623.0	543.0	21.1	0.0	20.2	0.7	1.6	1.6E-07
140	0	358	5	36304.4	36318.3	13.9	520.0	460.0	15.9	0.0	13.9	0.5	1.3	1.3E-07
140	0	358	5	36318.3	36332.9	14.6	775.0	725.0	13.2	0.0	14.6	0.5	1.4	1.4E-07
140	0	358	5	36332.9	36346.9	13.9	725.0	671.0	14.3	0.0	13.9	0.5	1.3	1.3E-07
140	0	358	5	36346.9	36359.7	12.8	671.0	615.0	14.8	0.0	12.8	0.4	1.2	1.2E-07
70	0	288	5	36364.8	36373.8	8.9	595.0	557.0	10.0	0.0	8.9	0.3	1.0	1.0E-07
70	0	288	5	36373.8	36381.7	7.9	557.0	514.0	11.4	0.0	7.9	0.3	0.9	9.2E-08
70	0	288	5	36381.7	36389.7	8.0	514.0	482.0	8.5	0.0	8.0	0.3	0.9	9.3E-08

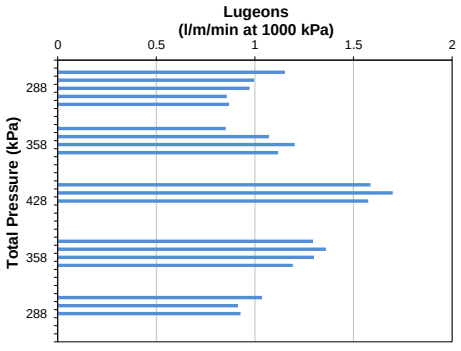
Notes Drum readings not taken for some pressure stages due to drum refilling



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	288	0.28	0.97
2	358	0.38	1.06
3	428	0.69	1.62
4	358	0.46	1.29
5	288	0.28	0.96

Houlsby Flow Pattern	Dilation
Houlsby Lugeon value	1
Burgess Lugeon value	3

Calculated: SA
Checked: JDB
Date: 16-Apr-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH103
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	33.20 - 39.20m

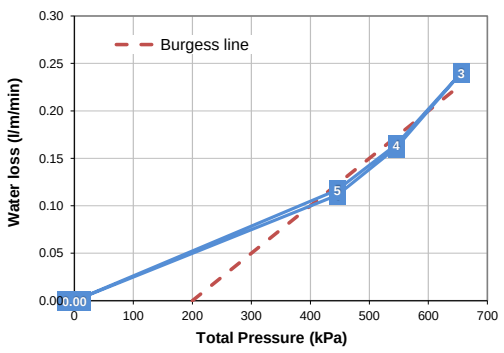
Test Details

Date:	10-Apr-25	Bottom of packer (m):	33.20	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	39.20	Vertical Depth to groundwater (m):	33.2	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
110	0	446	5	36417.9	36421.1	3.3	780.0	764.0	4.2	0.0	3.3	0.1	0.2	2.4E-08
110	0	446	5	36421.1	36424.5	3.4	764.0	750.0	3.7	0.0	3.4	0.1	0.3	2.5E-08
110	0	446	5	36424.5	36427.9	3.3	750.0	736.0	3.7	0.0	3.3	0.1	0.3	2.5E-08
210	0	546	5	36428.5	36433.2	4.8	715.0	700.0	4.0	0.0	4.8	0.2	0.3	2.9E-08
210	0	546	5	36433.2	36438.2	5.0	700.0	680.0	5.3	0.0	5.0	0.2	0.3	3.1E-08
210	0	546	5	36438.2	36443.0	4.8	680.0	660.0	5.3	0.0	4.8	0.2	0.3	2.9E-08
320	0	656	5	36445.3	36452.7	7.4	632.0	601.0	8.2	0.0	7.4	0.2	0.4	3.8E-08
320	0	656	5	36452.7	36459.7	7.0	601.0	570.0	8.2	0.0	7.0	0.2	0.4	3.6E-08
320	0	656	5	36459.7	36466.9	7.2	570.0	540.0	7.9	0.0	7.2	0.2	0.4	3.7E-08
210	0	546	5	36467.2	36472.0	4.8	534.0	513.0	5.5	0.0	4.8	0.2	0.3	2.9E-08
210	0	546	5	36472.0	36477.1	5.1	513.0	492.0	5.5	0.0	5.1	0.2	0.3	3.1E-08
210	0	546	5	36477.1	36482.0	4.9	492.0	470.0	5.8	0.0	4.9	0.2	0.3	3.0E-08
110	0	446	5	36482.4	36486.0	3.6	462.0	445.0	4.5	0.0	3.6	0.1	0.3	2.7E-08
110	0	446	5	36486.0	36489.5	3.5	445.0	430.0	4.0	0.0	3.5	0.1	0.3	2.6E-08
110	0	446	5	36489.5	36492.9	3.4	430.0	420.0	2.6	0.0	3.4	0.1	0.3	2.5E-08

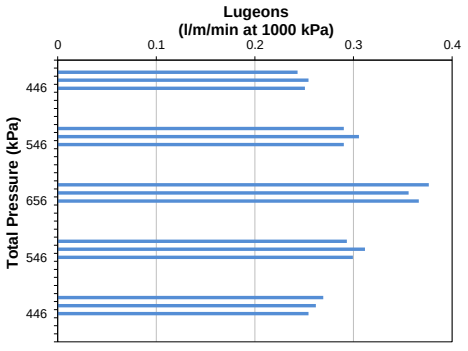
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	446	0.11	0.25
2	546	0.16	0.30
3	656	0.24	0.37
4	546	0.16	0.30
5	446	0.12	0.26

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.3
Burgess Lugeon value	0.5

Calculated: SA
Checked: JDB
Date: 12-Apr-25



WATER PRESSURE TEST RESULTS

Client :	Cottonwood Development Pty Ltd	**Project No. :**	222462
Project :	Proposed Mixed-Use Residential Redevelopment	**Bore :**	BH103
Location :	88 Waterloo Road, Macquarie Park	**Test section :**	39.2 - 45.2 m

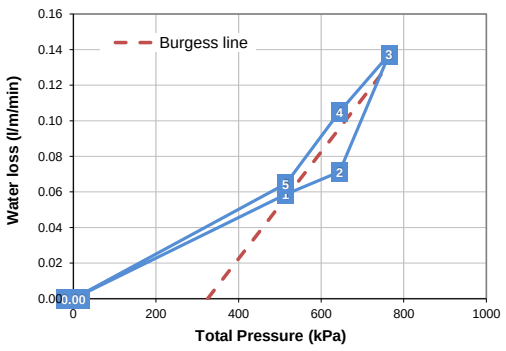
Test Details

Date:	10-Apr-25	Bottom of packer (m):	39.20	Height of pressure gauge (m):	1.0	Drum Area (m^2):
Bore diameter (mm):	61	Bore depth (m):	45.20	Vertical Depth to groundwater (m):	39.2	0.264
Bore inclination (deg):	90	Section length (m):	6.00	(or depth to base of packer)		

Hg = gauge pressure, Hl = head loss in rods and packer, Hw = (gauge height + groundwater depth)x 9.81, Total = Hg+Hw-Hl

PRESSURE			Test	FLOW RATES								Water	Lugeons	Approx
				Flowmeter			Drum readings			Leakage	Assigned	Loss		Permeability
Hg	Hl	Total	Duration	Initial	Final	Total	Initial	Final	Equivalent		Flow		(l/m/min at	
(kPa)	(kPa)	(kPa)	(min)	(litres)	(litres)	(litres)	(mm)	(mm)	litres	(litres)	(litres)	(l/m/min)	1000 kPa)	(m/sec)
120	0	514	5	36517.0	36517.0	0.0	645.0	639.0	1.6	0.0	1.6	0.1	0.1	1.0E-08
120	0	514	5	36517.0	36517.0	0.0	639.0	632.0	1.8	0.0	1.8	0.1	0.1	1.2E-08
120	0	514	5	36517.0	36517.0	0.0	632.0	625.0	1.8	0.0	1.8	0.1	0.1	1.2E-08
250	0	644	5	36517.2	36518.2	1.0	616.0	603.0	3.4	0.0	1.0	0.0	0.1	5.2E-09
250	0	644	5	36518.2	36520.0	1.8	603.0	587.0	4.2	0.0	1.8	0.1	0.1	9.3E-09
250	0	644	5	36520.0	36522.3	2.3	587.0	572.0	4.0	0.0	2.3	0.1	0.1	1.2E-08
250	0	644	5	36522.3	36525.2	2.9	572.0	555.0	4.5	0.0	2.9	0.1	0.2	1.5E-08
250	0	644	5	36525.2	36527.9	2.7	555.0	536.0	5.0	0.0	2.7	0.1	0.1	1.4E-08
370	0	764	5	36532.5	36536.6	4.1	738.0	716.0	5.8	0.0	4.1	0.1	0.2	1.8E-08
370	0	764	5	36536.6	36540.8	4.2	716.0	697.0	5.0	0.0	4.2	0.1	0.2	1.8E-08
370	0	764	5	36540.8	36544.9	4.1	697.0	678.0	5.0	0.0	4.1	0.1	0.2	1.8E-08
250	0	644	5	36546.3	36549.5	3.2	672.0	657.0	4.0	0.0	3.2	0.1	0.2	1.7E-08
250	0	644	5	36549.5	36552.3	2.8	657.0	642.0	4.0	0.0	2.8	0.1	0.1	1.4E-08
250	0	644	5	36552.3	36555.5	3.2	642.0	625.0	4.5	0.0	3.2	0.1	0.2	1.7E-08
250	0	644	5	36555.5	36558.9	3.4	625.0	608.0	4.5	0.0	3.4	0.1	0.2	1.8E-08
120	0	514	5	36559.8	36559.9	0.1	607.0	601.0	1.6	0.0	1.6	0.1	0.1	1.0E-08
120	0	514	5	36559.9	36559.9	0.0	601.0	594.0	1.8	0.0	1.8	0.1	0.1	1.2E-08
120	0	514	5	36559.9	36559.9	0.0	594.0	585.0	2.4	0.0	2.4	0.1	0.2	1.5E-08

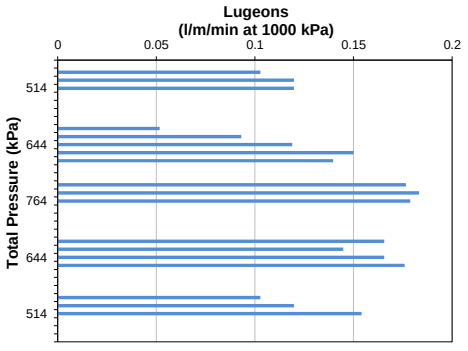
Notes



Averages			
Stage	Pressure (kPa)	Water Loss (l/m/min)	Lugeons (l/m/min at 1000kPa)
1	514	0.06	0.11
2	644	0.07	0.11
3	764	0.14	0.18
4	644	0.10	0.16
5	514	0.06	0.13

Houlsby Flow Pattern	Laminar Flow
Houlsby Lugeon value	0.1
Burgess Lugeon value	0.3

Calculated: SA
Checked: JDB
Date: 12-Apr-25



Appendix F

Groundwater quality results

Table F1: Summary of laboratory results - groundwater

Sample ID	Units	Total or filtered	PQL	DGV, Freshwater - 95% / 99% LOP	ANZECC (2000) South East Australia -	BH1	BH2	BD1/2024 1003	BH5	BH101	BH102	BD1/20251 021	BH103
Sampled date						03/10/24	03/10/24	03/10/24	03/10/24	21/10/25	21/10/25	21/10/25	21/10/25
Field parameters													
pH	-	-	-	-	6.5 - 8.0	6.2	5.6	-	4.9	-	-	-	-
Dissolved oxygen	mg/L	T	5	-	7.0 - 9.0	1.2	1.3	-	2.4	-	-	-	-
Physiochemical parameters													
Total Dissolved Solids	mg/L	T	5	-	-	300	-	-	320	340	-	-	390
Total Suspended Solids (Lab)	mg/L	T	5	-	-	320	-	-	560	29	-	-	86
Anions and cations													
Hardness	mg/L	F	3	-	-	67	-	-	51	91	-	-	76
Calcium	mg/L	F	0.5	-	-	12	-	-	4	14	-	-	7
Potassium	mg/L	F	0.5	-	-	2	-	-	1	2	-	-	2
Sodium	mg/L	F	0.5	-	-	55	-	-	79	66	-	-	66
Magnesium	mg/L	F	0.5	-	-	9.1	-	-	9.7	14	-	-	14
Alkalinity (Carbonate as CaCO3)	mg/L	T	5	-	-	< 5	-	-	< 5	< 5	-	-	< 5
Chloride	mg/L	T	1	-	-	87	-	-	110	110	-	-	130
Alkalinity (total as CaCO3)	mg/L	T	5	-	-	92	-	-	16	100	-	-	69
Alkalinity (Hydroxide as CaCO3)	mg/L	T	5	-	-	< 5	-	-	< 5	< 5	-	-	< 5
Alkalinity (Bicarbonate as CaCO3)	mg/L	T	5	-	-	92	-	-	16	100	-	-	69
Sulphate	mg/L	T	1	-	-	15	-	-	45	21	-	-	15
Ionic Balance	%	T		-	-	-10	-	-	2	-10	-	-	-10
Metals													
Arsenic	µg/L	F	1	13[4]	-	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	µg/L	F	0.1	0.2	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chromium (Total)	µg/L	F	1	1[5]	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Copper	µg/L	F	1	1.4	-	< 1	< 1	< 1	5	3	2	3	4
Ferrous Iron	µg/L	T	50	280[1]	-	850	-	-	970	19,000	-	-	29,000
Lead	µg/L	F	1	3.4	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Mercury	µg/L	F	0.05	0.06	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	µg/L	F	1	11	-	16	36	34	27	11	8	11	17
Zinc	µg/L	F	1	8	-	100	140	160	150	130	250	130	75
TRH (NEPM 2013)													
TRH C6-C10	µg/L	T	10	-	-	< 10	< 10	< 10	< 10	< 10	20	< 10	< 10
TRH >C10-C16	µg/L	T	50	-	-	< 50	67	130	< 50	800	930	850	390
TRH F1 (C6-C10 minus BTEX)	µg/L	T	10	-	-	< 10	< 10	< 10	< 10	< 10	20	< 10	< 10
TRH F2 (>C10-C16 minus	µg/L	T	50	-	-	< 50	67	130	< 50	800	930	850	390
TRH F3 (>C16-C34)	µg/L	T	100	-	-	210	< 100	< 100	< 100	400	550	680	330
TRH F4 (>C34-C40)	µg/L	T	100	-	-	< 100	< 100	< 100	< 100	780	720	840	630
TRH >C10-C40 (sum)	µg/L	T	50	-	-	210	70	130	< 50	2,000	2,200	2,400	1,300
TRH C10-C14	µg/L	T	50	-	-	< 50	68	130	< 50	< 50	56	51	< 50
TRH C10-C36 (sum)	µg/L	T	50	-	-	240	70	130	< 50	1,400	1,700	1,800	880
TRH C15-C28	µg/L	T	100	-	-	110	< 100	< 100	< 100	990	1,100	1,100	470
TRH C29-C36	µg/L	T	100	-	-	130	< 100	< 100	< 100	410	600	720	400
TRH C6-C9	µg/L	T	10	-	-	< 10	< 10	< 10	< 10	< 10	19	< 10	< 10
BTEXN (all)													
Benzene	µg/L	T	1	950	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	µg/L	T	1	180	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Ethylbenzene	µg/L	T	1	80	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Xylene (o)	µg/L	T	1	350	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Xylene (m & p)	µg/L	T	2	75[2]	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Naphthalene (VOC)	µg/L	T	1	16	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
PAH													
Acenaphthene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	µg/L	T	0.1	0.01	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	µg/L	T	0.1	0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b+j+k)fluoranthene	µg/L	T	0.2	-	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Benzo(g,h,i)perylene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	µg/L	T	0.1	1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	µg/L	T	0.1	16	-	< 0.1	1	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	µg/L	T	0.1	0.6	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	µg/L	T	0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene TEQ	µg/L	T	0.5	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH (sum of analysed)	µg/L	T	0.1	-	-	< 0.1	1	1.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenols													
Phenolics (Total)(as phenol)	mg/L	T	0.05	0.32	-	< 0.05	< 0.5	-	< 0.5	< 0.05	< 0.05	-	< 0.05
PCB													
Aroclor 1016	µg/L	T	2	-	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1221	µg/L	T	2	-	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1232	µg/L	T	2	-	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1242	µg/L	T	2	0.3	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1248	µg/L	T	2	-	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1254	µg/L	T	2	0.01	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
Aroclor 1260	µg/L	T	2	-	-	< 2	< 2	-	< 2	< 2	< 2	-	< 2
OCP													
a-BHC	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Aldrin	µg/L	T	0.2	0.001[3]	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
b-BHC	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Chlordane (cis)	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Chlordane (trans)	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
d-BHC	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
DDD	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
DDT	µg/L	T	0.2	0.006	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2

Table F1: Summary of laboratory results - groundwater

Sample ID	Units	Total or filtered	PQL	DGV, Freshwater - 95% / 99% LOP	ANZECC (2000) South East Australia -	BH1	BH2	BD1/20241003	BH5	BH101	BH102	BD1/20251021	BH103
Sampled date						03/10/24	03/10/24	03/10/24	03/10/24	21/10/25	21/10/25	21/10/25	21/10/25
Dieldrin	µg/L	T	0.2	0.01[3]	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Endosulfan I	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Endosulfan II	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Endosulfan sulphate	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Endrin	µg/L	T	0.2	0.01	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Endrin aldehyde	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
g-BHC (Lindane)	µg/L	T	0.2	0.2	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Heptachlor	µg/L	T	0.2	0.01	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Heptachlor epoxide	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Hexachlorobenzene (HCB)	µg/L	T	0.2	0.05	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Methoxychlor	µg/L	T	0.2	0.005[3]	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Mirex	µg/L	T	0.2	0.04[3]	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
p,p'-DDE (4,4-DDE)	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
OPP													
Azinophos methyl (Guthion)	µg/L	T	0.2	0.01	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Bromophos-ethyl	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Chlorpyrifos	µg/L	T	0.2	0.01	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Chlorpyrifos-methyl	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Coumaphos	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Diazinon	µg/L	T	0.2	0.01	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Dichlorvos	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Dimethoate	µg/L	T	0.2	0.15	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Disulfoton	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Ethion	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Ronnel	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Fenamiphos	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Fenitrothion	µg/L	T	0.2	0.2	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Fenthion	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Malathion	µg/L	T	0.2	0.05	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Methyl parathion	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Methidathion	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Mevinphos (Phosdrin)	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Parathion	µg/L	T	0.2	0.004	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Phorate	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Phosalone	µg/L	T	0.2	-	-	< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	-	< 0.2
Microbiological													
E. Coli	cfu/100ml	T	1	-	-	-	-	-	< 100	-	-	-	-
Total coliforms	cfu/100ml	T	1	-	-	-	-	-	<1000	-	-	-	-
Other													

Criteria adopted from the following guidelines:

ANZG, Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018). DGV for 95% LOP or 99% LOP as recommended by ANZG (2018)

Notes:

This table does not represent the full analytical results, please refer to the laboratory certificate(s) for full details

Results displayed in grey text were recorded below the laboratory practical quantitation limit (PQL)

Cream shading indicates results with PQL above one or more assessment criteria

ADWG – Australian drinking water guidelines

DGV – default guideline value

HSL – health screening level

IMW – intrusive maintenance worker

LOP – level of protection of species

PQL – practical quantitation limit

Guideline Notes:

[1]Criteria for iron used as a conservative screen for ferrous iron

[2]Criteria for xylene (m) used as a conservative screen for total xylenes

[3]Unknown LOP

[4]Criteria for arsenic V used as a conservative screen for total arsenic

[5]DGV for chromium (VI) adopted as a conservative screen for total chromium. DGV of unknown reliability / LOP for chromium (III) is 3.3 ug/L

Appendix G

Laboratory Documentation

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

CERTIFICATE OF ANALYSIS 393525

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rhys McMillan
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**222462.01 Macquarie Park**
Number of Samples	4 Water
Date samples received	21/10/2025
Date completed instructions received	21/10/2025

Analysis Details

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

Samples were analysed as received from the client unless as indicated below in the method summaries. Results relate specifically to the samples as received.

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

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

Report Details

Date results requested by	28/10/2025
Date of Issue	28/10/2025

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Nancy Zhang, Laboratory Manager, Sydney
Tabitha Roberts, Senior Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water					
Our Reference		393525-1	393525-2	393525-3	393525-4
Your Reference	UNITS	BH101	BH102	BH103	BD1/20251021
Date Sampled		21/10/2025	21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025	23/10/2025
TRH C_6 - C_9	µg/L	<10	19	<10	<10
TRH C_6 - C_{10}	µg/L	<10	20	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	20	<10	<10
Benzene	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	97	102	100	98
Surrogate Toluene-d8	%	98	102	101	99
Surrogate 4-Bromofluorobenzene	%	99	101	99	101

svTRH (C10-C40) in Water					
Our Reference		393525-1	393525-2	393525-3	393525-4
Your Reference	UNITS	BH101	BH102	BH103	BD1/20251021
Date Sampled		21/10/2025	21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	22/10/2025	23/10/2025	23/10/2025	23/10/2025
TRH C_{10} - C_{14}	µg/L	<50	56	<50	51
TRH C_{15} - C_{28}	µg/L	990	1,100	470	1,100
TRH C_{29} - C_{36}	µg/L	410	600	400	720
Total +ve TRH (C10-C36)	µg/L	1,400	1,700	880	1,800
TRH >C_{10} - C_{16}	µg/L	800	930	390	850
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	800	930	390	850
TRH >C_{16} - C_{34}	µg/L	400	550	330	680
TRH >C_{34} - C_{40}	µg/L	780	720	630	840
Total +ve TRH (>C10-C40)	µg/L	2,000	2,200	1,300	2,400
Surrogate o-Terphenyl	%	93	78	76	99

PAHs in Water					
Our Reference	UNITS	393525-1	393525-2	393525-3	393525-4
Your Reference		BH101	BH102	BH103	BD1/20251021
Date Sampled		21/10/2025	21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025	23/10/2025
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	79	79	75	83

Organochlorine Pesticides in Water				
Our Reference	UNITS	393525-1	393525-2	393525-3
Your Reference		BH101	BH102	BH103
Date Sampled		21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025
alpha-BHC	µg/L	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Mirex	ug/L	<0.2	<0.2	<0.2
Surrogate 4-Chloro-3-NBTF	%	69	74	71

OP Pesticides in Water				
Our Reference	UNITS	393525-1	393525-2	393525-3
Your Reference		BH101	BH102	BH103
Date Sampled		21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025
Dichlorvos	µg/L	<0.2	<0.2	<0.2
Mevinphos	µg/L	<0.2	<0.2	<0.2
Phorate	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Disulfoton	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2
Parathion-Methyl	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2
Fenthion	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Methidathion	µg/L	<0.2	<0.2	<0.2
Fenamiphos	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Phosalone	µg/L	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Coumaphos	µg/L	<0.2	<0.2	<0.2
Surrogate 4-Chloro-3-NBTF	%	69	74	71

PCBs in Water				
Our Reference		393525-1	393525-2	393525-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	23/10/2025	23/10/2025	23/10/2025
Aroclor 1016	µg/L	<2	<2	<2
Aroclor 1221	µg/L	<2	<2	<2
Aroclor 1232	µg/L	<2	<2	<2
Aroclor 1242	µg/L	<2	<2	<2
Aroclor 1248	µg/L	<2	<2	<2
Aroclor 1254	µg/L	<2	<2	<2
Aroclor 1260	µg/L	<2	<2	<2
Surrogate 2-Fluorobiphenyl	%	70	71	66

Total Phenolics in Water				
Our Reference		393525-1	393525-2	393525-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water
Date extracted	-	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	22/10/2025	22/10/2025	22/10/2025
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05

HM in water - dissolved					
Our Reference	UNITS	393525-1	393525-2	393525-3	393525-4
Your Reference		BH101	BH102	BH103	BD1/20251021
Date Sampled		21/10/2025	21/10/2025	21/10/2025	21/10/2025
Type of sample		Water	Water	Water	Water
Date prepared	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Date analysed	-	22/10/2025	22/10/2025	22/10/2025	22/10/2025
Arsenic-Dissolved	µg/L	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	3	2	4	3
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	11	8	17	11
Zinc-Dissolved	µg/L	130	250	75	130

Miscellaneous Inorganics			
Our Reference		393525-1	393525-3
Your Reference	UNITS	BH101	BH103
Date Sampled		21/10/2025	21/10/2025
Type of sample		Water	Water
Date prepared	-	22/10/2025	22/10/2025
Date analysed	-	22/10/2025	22/10/2025
Total Suspended Solids	mg/L	29	86
Total Dissolved Solids (grav)	mg/L	340	390
Ferrous Iron	mg/L	19	29

Ion Balance			
Our Reference		393525-1	393525-3
Your Reference	UNITS	BH101	BH103
Date Sampled		21/10/2025	21/10/2025
Type of sample		Water	Water
Date prepared	-	22/10/2025	22/10/2025
Date analysed	-	22/10/2025	22/10/2025
Calcium - Dissolved	mg/L	14	7.0
Potassium - Dissolved	mg/L	2	2
Sodium - Dissolved	mg/L	66	66
Magnesium - Dissolved	mg/L	14	14
Hardness (calc) equivalent $CaCO_3$	mg/L	91	76
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	100	69
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	100	69
Sulphate, SO4	mg/L	21	15
Chloride, Cl	mg/L	110	130
Ionic Balance	%	-10	-10

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals/elements by ICP-AES. Total Phosphate determined stochiometrically from Phosphorus (assumed to be present as Phosphate). Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation. Submission of low masses of sample e.g. for dust samples, may result in raised PQLs. Where molecular anion forms are calculated from an element (e.g. SO4 from S or PO4 from P stoichiometrically), the assumption is that the element is only present in that molecular anion form.
Metals-021	Determination of Mercury by Cold Vapour AAS.

Method ID	Methodology Summary
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	1	23/10/2025	23/10/2025		23/10/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	95	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	95	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	93	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	96	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	97	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	94	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	98	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	1	97	98	1	101	[NT]
Surrogate Toluene-d8	%		Org-023	102	1	98	99	1	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	101	1	99	99	0	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			22/10/2025	1	22/10/2025	23/10/2025		22/10/2025	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	74	39	99	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	990	950	4	113	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	410	610	39	100	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	800	820	2	99	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	400	570	35	113	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	780	740	5	100	[NT]
Surrogate o-Terphenyl	%		Org-020	101	1	93	92	1	101	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	1	23/10/2025	23/10/2025		23/10/2025	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	89	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	71	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	93	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	101	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	81	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	83	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	78	1	79	77	3	96	[NT]

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	1	23/10/2025	23/10/2025		23/10/2025	[NT]
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	100	[NT]
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	99	[NT]
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	101	[NT]
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	101	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	105	[NT]
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	92	[NT]
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	95	[NT]
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	95	[NT]
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	105	[NT]
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	100	[NT]
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Mirex	ug/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	98	1	69	70	1	84	[NT]

QUALITY CONTROL: OP Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	1	23/10/2025	23/10/2025		23/10/2025	[NT]
Dichlorvos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	107	[NT]
Mevinphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Phorate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Dimethoate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Disulfoton	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Parathion-Methyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	93	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	126	[NT]
Malathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	112	[NT]
Chlorpyriphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	107	[NT]
Fenthion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Parathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	135	[NT]
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Methidathion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Fenamiphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	100	[NT]
Phosalone	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Coumaphos	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	98	1	69	70	1	84	[NT]

QUALITY CONTROL: PCBs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	[NT]
Date analysed	-			23/10/2025	1	23/10/2025	23/10/2025		23/10/2025	[NT]
Aroclor 1016	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	117	[NT]
Aroclor 1260	µg/L	2	Org-021/022/025	<2	1	<2	<2	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	120	1	70	69	1	81	[NT]

QUALITY CONTROL: Total Phenolics in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	393525-2
Date extracted	-			22/10/2025	1	22/10/2025	22/10/2025		[NT]	22/10/2025
Date analysed	-			22/10/2025	1	22/10/2025	22/10/2025		[NT]	22/10/2025
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	1	<0.05	<0.05	0	[NT]	94

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	393525-2
Date prepared	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	22/10/2025
Date analysed	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	22/10/2025
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	108	108
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	110	111
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	115	114
Copper-Dissolved	µg/L	1	Metals-022	<1	1	3	3	0	112	108
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	111	101
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	87	90
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	11	11	0	112	110
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	130	130	0	114	112

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	393525-3
Date prepared	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	22/10/2025
Date analysed	-			22/10/2025	1	22/10/2025	22/10/2025		22/10/2025	22/10/2025
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	29	[NT]		96	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	340	330	3	87	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	1	19	18	5	84	#

QUALITY CONTROL: Ion Balance					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			22/10/2025	[NT]	[NT]	[NT]	[NT]	22/10/2025	[NT]
Date analysed	-			22/10/2025	[NT]	[NT]	[NT]	[NT]	22/10/2025	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	85	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	87	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	119	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]

Result Definitions

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

Quality Control Definitions

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

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.

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.

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.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

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

Report Comments

MISC_INORG: # Percent recovery not reported due to the high concentration of the analyte/s in the sample/s. However, an acceptable recovery was obtained for the LCS.

COC 21/10/25, 1716

Douglas PARTNERS | GROUNDED EXPERTISE

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	222462.01	**Suburb:**	Macquarie Park	**To:**	Envirolab Services
Project Manager:	Rhys McMillan	**Order Number:**		**Sampler:** NW	12 Ashley St, Chatswood NSW 2067
Email:	Rhys.McMillan@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.cor
Prior Storage:	☐ Fridge ☐ Freezer ☑ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☐ No ☐ Yes (If YES, then handle, transport and store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Combo 8L	Combo 3L	Fe2+	TSS/TDS	ecoli / total coliforms	major anions and cations						Notes/ Preservation/ Additional Requirements
1	BH101	-	-	21/10/25	W	G,P	X		X	X		X						
2	BH102	-	-	21/10/25	W	G,P	X											
3	BH103	-	-	21/10/25	W	G,P	X		X	X		X						
4	BD1/20251021	-	-	21/10/25	W	G,P		X										

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph (02) 9910 6200

Job No: 393525
Date Received: 21/10/25
Time Received: 1600
Received By: RH
Temp: Cool/Ambient
Cooling: ce/icepack
Security: Intact/Broken/None

Metals to analyse:			**LAB RECEIPT**
Number of samples in container:		**Transported to laboratory by:** Courier	**Lab Ref. No:**
Send results to:	Douglas Partners Pty Ltd		**Received by:** Richard Hem
Address:	96 Hermitage Road, West Ryde NSW 211	**Phone:** (02) 9809 0666	**Date & Time** 21/10/25 1600
Relinquished by:	Nathan Woodward	**Date:** 21/10/2025 **Signed:**	**Signed:**

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Rhys McMillan

Sample Login Details

Your reference	222462.01 Macquarie Park
Envirolab Reference	393525
Date Sample Received	21/10/2025
Date Instructions Received	21/10/2025
Date Results Expected to be Reported	28/10/2025

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	4 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	ce
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	Organochlorine Pesticides in Water	OP Pesticides in Water	PCBs in Water	Total Phenolics in Water	HM in water - dissolved	Total Suspended Solids	Total Dissolved Solids (grav)	Ferrous Iron	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness (calc) equivalent CaCO3	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance
BH101	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH102	✓	✓	✓	✓	✓	✓	✓	✓															
BH103	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BD1/20251021	✓	✓	✓					✓															

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

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Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

We acknowledge receipt of your samples and Purchase Order (PO) (if provided). If a PO includes your terms & conditions, Envirolab hereby expressly rejects and will not be bound by any external or third-party terms and conditions, including those referenced or attached to a PO.

All services to be performed by Envirolab will be governed exclusively by Envirolab's General Terms and Conditions attached to this acknowledgement (Envirolab Terms) via hyperlink or found on our websites.

If you do not object in writing within two (2) business days of the date of this acknowledgement, you will be deemed to have accepted the Envirolab Terms. In addition, your provision of further instructions, additional samples, payment of any invoice, or acceptance of services or results from Envirolab will constitute acceptance of the Envirolab Terms. For clarity, Envirolab's commencement or continuation of work following receipt of the PO is performed solely under the Envirolab Terms and does not constitute acceptance of any external terms. All rights are expressly reserved.