Douglas PARTNERS

GROUNDED EXPERTISE

Dewatering Management Plan

Proposed Redevelopment of Compass Centre

83-99 North Terrace, Bankstown NSW

Prepared for Altis ARET Sub Trust 21

Project 213805.04

11 June 2025

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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
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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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Dewatering Management Plan
Proposed Redevelopment of Compass Centre
83-99 North Terrace, Bankstown NSW

1. Introduction

This document prepared by Douglas Partners Pty Ltd (Douglas) outlines the dewatering management plan (DMP) for the proposed redevelopment of compass centre at 83-99 North Terrace, Bankstown NSW. The original work was commissioned in an email dated 12 June 2024 by Craig Sanders of Essence Project Management on behalf of the client Altis ARET Sub Trust 21. A recent supplementary investigation and update of the DMP were commissioned by Craig Sanders dated 15 April 2025.

It is understood that the proposed development includes the demolition of existing buildings and construction of three high-rise towers over a shared two-level basement. The basement is proposed to be designed and constructed as a 'drained' basement.

This assessment is based on the results of a geotechnical investigation, a preliminary site investigation (PSI) and recent supplementary testing (reported herein, refer Section 5) carried out by Douglas on the site (ref: 213805.02.R.001.Rev0 dated November 2023, 213805.03.R.001.Rev0 dated February 2024) as well as the long term groundwater level monitoring between 29 September 2023 and 21 June 2024 (ref: 213805.04.R.002.Rev0, dated June 2024) and between 16 April 2025 and 28 May 2025.

A groundwater assessment including 3-dimensional numerical modelling was undertaken as part of this DMP to assess expected inflow rates and changes to groundwater levels on adjacent areas. Details of the assessment are provided in this report.

The current revision has been prepared in response to comments by Water NSW (and DCCEEW) as discussed in Section 4.

2. Site description

The site is located at 83-99 North Terrace, Bankstown and occupies an area of approximately 8,175 m^2. The site slopes down gently from the north-west to south-east, varying between about RL 22 m and RL 25 m AHD.

The site is bounded by The Mall, The Appian Way, North Terrace and Fetherstone Street (to the north, east, south and west, respectively) but the site excludes the existing multi-storey (approximately 12-storey) Fetherstone Apartments on the western boundary of the site (at 3-7 Fetherstone Street). It is understood from the supplied drawings that the multi-storey building at 3-7 Fetherstone Street has a single level basement and is founded above the proposed excavation level for this development.

The site is currently occupied by the Compass Centre on the southern and eastern portions of the site, which comprises single and double storey commercial premises and a multi-storey

(approximately 8-storey) building, and an on-grade asphaltic concrete carpark across the northern and western portion of the site. A single-level basement is present beneath the Compass Centre on the southern portion of the site and is accessed via Fetherstone Street.

The site's topographical setting is shown in Figure 1, together with registered groundwater bores and surface water features.

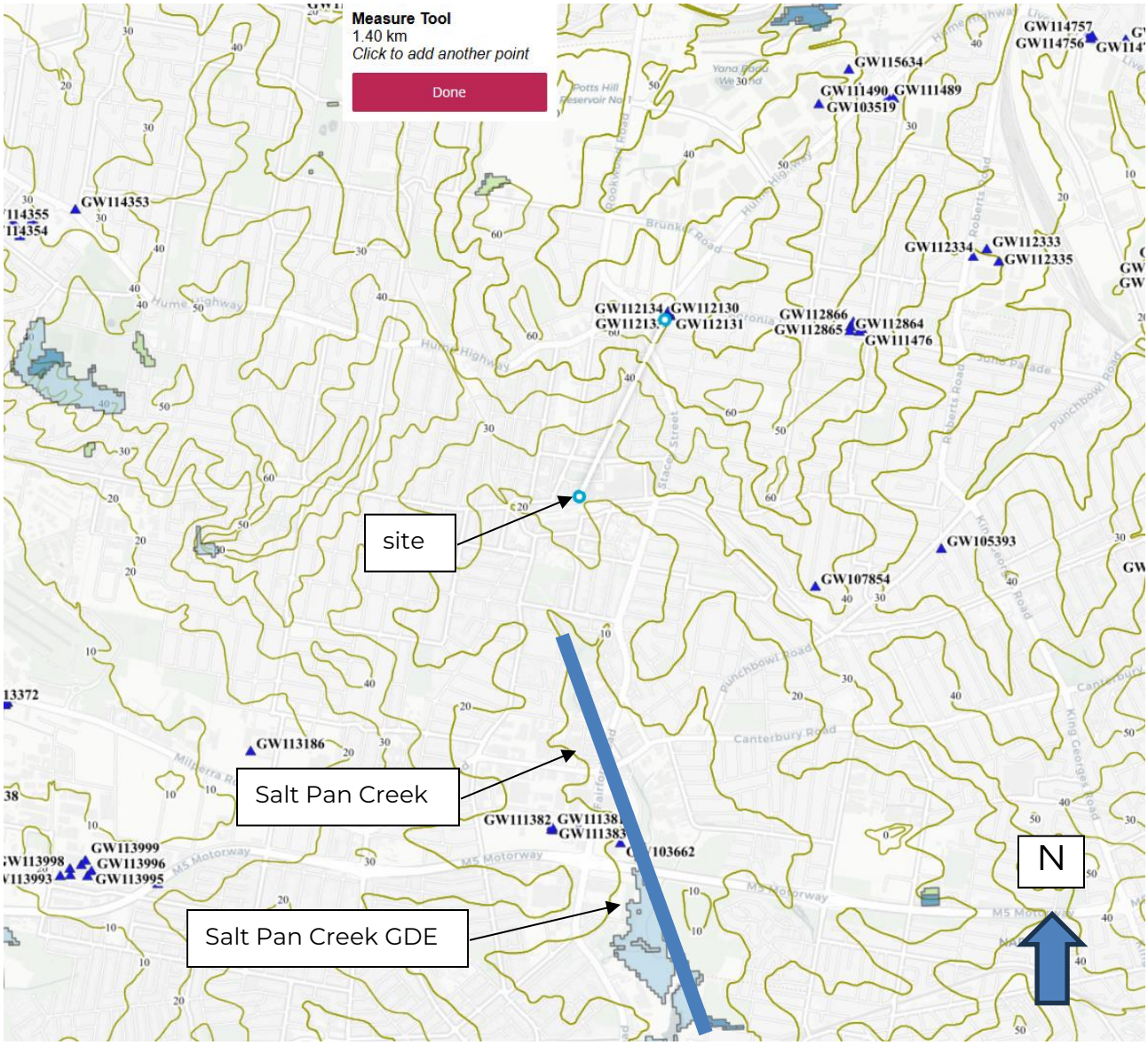

Figure 1: Site Location with 10 m Surface Contours, Registered Groundwater Bores and GDEs

3. Background information

3.1 Geology

Reference to the Sydney 1:100,000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale of the Wianamatta Group. The Ashfield Shale formation typically comprises dark grey shale and laminite (finely interbedded sandstones and siltstones).

3.2 Hydrogeology

The primary permeability of the Ashfield Shale is known to be low. Therefore, groundwater within the project area is understood to mostly occur along defects where secondary permeability of the rock has been enhanced.

The aquifer within the Ashfield Shale in the project area appears to be unconfined and is mostly recharged by rainfall infiltration.

3.3 Hydrology

The site is located about 600 m north of Salt Pan Creek, as shown in Figure 1. No other significant hydrological features are present in the vicinity of the project.

Based on the regional topography and the inferred flow direction of nearby water courses, the anticipated flow direction of groundwater beneath the site was previously inferred to the south, towards Salt Pan Creek.

3.4 Acid sulfate soil

Reference to NSW Acid Sulfate Soil (ASS) Risk mapping from council local environmental planning (LEP) mapping indicates that the site is in an area of low risk for ASS. Given that the site sits at an elevation of approximately 22 m AHD and is on residual soils, it is highly unlikely that ASS will be encountered. Therefore, no further ASS assessment is required.

3.5 Groundwater receptors

A search of the NSW Office of Water groundwater database revealed that no registered water wells are located within 500 m of the site, as shown in Figure 1.

A review of the groundwater dependent ecosystems (GDE) Atlas from Australian Bureau of Meteorology showed that there are no mapped GDEs within 1 km of the site. Note that the parts of Salt Pan Creek listed as a high priority GDE, in the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023, are located about 2.5 km away from the site. Reference to the NSW Department of Planning, Housing and Infrastructure's Riparian Lands Watercourses database indicates the site does not lie within 1 km of riparian lands zones.

4. Supplementary investigation and response to water NSW comments

In response to Water NSW comments (reference IDAS1158820 dated 11 February 2025, including DCCEEW comments, WAMS 20390), a supplementary groundwater investigation was undertaken to address the following comments / items:

Water NSW / DCCEEW Item	Additional Scope of Works / Response
Limited groundwater quality data available to characterise risks posed by former dry cleaner and service station	Installation and sampling of one additional groundwater well (BH301) in the south-east of the site (as close as practicable to the inferred location of the former service station, as limited by site access). Sampling from two existing groundwater wells to provide updated information on the groundwater quality across the site Installation of five additional soil vapour pins in the south-east of the site to supplement limited access for groundwater investigation. Testing to provide indirect evidence of potential significant volatile contaminants in groundwater. Updated data discussed in Section 5.2
Inclusion of borehole logs	Relevant current and previous borehole logs attached (Appendix C)
Groundwater model boundaries. Expansion of 3D groundwater model boundaries to at least 1 km from the site boundary to assess impacts to Salt Pan Creek Clarification of the vertical extent of the model	Updated model and clarified in Section 8. Model boundaries were extended to 600 m from the excavation boundaries and over 60 m below the excavation level. The predicted water levels indicate drawdown reduced to less than 0.5 m at about 300 m away from the excavation. Also note that the parts of Salt Pan Creek listed as a high priority GDE, in the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023, are located about 2.5 km away from the site and therefore extending the model boundary to 1 km is considered unnecessary.
Drawdown results to be shown on a map	Refer Figure 4.
Establishing groundwater level trigger criteria and contingencies	Refer Section 10
Potential impacts from the adjoining single level basement at 3-7 Featherstone Street and existing basement on the subject site	Refer Section 8.4.2

Water NSW / DCCEEW Item	Additional Scope of Works / Response
Establishing permeability of clay soil layers given previous wells (BH3/4) screened across clay and siltstone / sandstone	Refer Section 8.3.1. Groundwater table does not intersect the clay layer. Therefore, the permeability of the clay layer is not essential for the impact assessment. For the purpose of modelling, a relatively conservative (high) permeability value was selected for the clay layer.
Confirming minimum impacts as per the Aquifer Interference Policy	Refer Section 9.2
pH results previously not provided	Field measurements from previous and current supplementary testing discussed in Section 5.2
Monitoring requirements: Daily monitoring of groundwater levels during works, and at least one month after completion Measurement of physiochemical parameters (pH, turbidity) daily Groundwater to be held on-site prior to confirmation of testing results Weekly sampling of groundwater quality for the duration of the works Acceptable pH range of 6.5 – 8.5	Refer updated monitoring plan in Section 11
Lot 9 DP 777510 included on the site boundary, confirmation if part of the subject site	Drawings in Appendix B revised. Lot 9 was previously considered as part of the development but since removed.
Rising head tests not previously repeated 3 times in each borehole to demonstrate repeatability	Additional permeability testing undertaken in BH1 to BH4. Refer results in Table 3

5. Previous and supplementary investigations

Detailed information and results of the previous geotechnical and contamination investigations on the site are provided in the investigation reports prepared by Douglas (ref: 213805.02.R.001.Rev0 dated November 2023, 213805.03.R.001.Rev0 dated February 2024). The previous and supplementary investigations included cone penetration tests (CPTs) at six locations to depths of between 3.9 m and 4.7 m, drilling of seven cored boreholes (BH1 to BH6 and BH301) to a maximum depth of about 20.3 m. The locations of the CPTs and boreholes, along with the proposed basement outline, are shown on Drawing 1 in Appendix B (including the monitoring wells installed in BH1 to BH4 and BH301).

Results from the supplementary investigation are included in Appendix D (summary results), Appendix E (fieldwork records) and Appendix F (laboratory documentation).

5.1 Summary geotechnical results

5.1.1 Summary of strata

Table 1 summarises the levels at which different materials were encountered in the boreholes and CPTs.

The detailed test result sheets for the CPTs and borehole logs are given in Appendix C, together with notes describing the test method, interpretation and descriptions of the soil and rock.

Table 1: Summary of material strata levels

Material	Unit	Depth to Top of Unit (m BGL) [RL at Top of Unit (m AHD)]								
		1	2	3 / 3A	4	5	6	7	8	301
FILL / PAVEMENT	Unit 1	0.0 [22.3]	0.0 [22.3]	0.0 [22.4]	0.0 [22.5]	0.0 [22.5]	0.0 [22.7]	0.0 [22.0]	0.0 [22.0]	0.0 [22.9]
RESIDUAL CLAY	Unit 2	0.6 [21.7]	0.8 [21.5]	0.6 [21.8]	1.0 [21.5]	0.7 [21.8]	1.3 [21.9]	1.0 [21.6]	0.5 [21.5]	1.0 [21.9]
WEATHERED SILTSTONE	Unit 3	1.0 [21.3]	1.0 [21.3]	3.8 [18.6]	4.3 [18.2]	3.5 [19.0]	3.0 [19.7]	3.0 [19.0]	3.3 [18.7]	2.4 [20.5]
SILTSTONE: VL-L	Unit 4	1.2 [21.1]	1.3 [21.0]	4.8 [17.6]	4.6 [17.9]	3.9 [18.6]	3.5 [19.2]	NE	NE	3.2 [19.7]
SILTSTONE: L-M	Unit 5	3.3 [19.0]	5.2 [17.1]	6.0 [16.4]	5.2 [17.3]	5.4 [17.1]	4.4 [18.3]	NE	NE	4.7 [18.2]
INTERBEDDED SILTSTONE AND SANDSTONE: H-VH	Unit 6	NE	NE	12.2 [10.2]	12.2 [10.3]	12.6 [9.9]	12.7 [10.0]	NE	NE	NE
Termination Depth		11.61 [10.7]	12.10 [10.2]	15.00 [7.4]	15.18 [11.1]	15.00 [11.1]	20.35 [2.4]	4.12 [17.9]	3.96 [18.0]	9.73 [13.2]

Note: NE = not encountered VL = very low strength, L = low strength, M = medium strength, H = high strength, VH = very high strength

5.1.2 Groundwater levels

After installation, the five groundwater monitoring wells (BH1 to BH4 and BH301) were purged of drilling fluid using a submersible pump and digital data loggers were installed.

Long-term groundwater monitoring was carried out in BH1 to BH4 between 29 September 2023 and 21 June 2024 and in BH1 to BH3 between 16 April 2025 and 28 May 2025. The monitoring in BH1 to BH3 is still ongoing.

A summary of the manually measured groundwater levels within the site is provided in Table 2a, with statistics of groundwater measurements during the long-term monitoring provided in Table 2b, and hydrographs are presented in Appendix C. The locations of the groundwater monitoring wells are shown on Drawing 1. It should be noted that groundwater levels vary over time due to seasonal, climatic, and other factors.

Table 2a: Summary of groundwater level monitoring

Well	Manual Groundwater Level Measurement (m BGL) [m AHD]						
	9/10/23	11/10/23	7/12/23	12/1/24	21/6/24	16/4/25	28/5/25
BH1	4.65 [17.65]	-	4.53 [17.77]	4.49 [17.81]	4.45 [17.85]	4.42 [17.88]	4.37 [17.93]
BH2	4.65 [17.65]	-	4.50 [17.80]	4.46 [17.84]	4.44 [17.86]	4.39 [17.91]	4.39 [17.91]
BH3	-	4.74 [17.66]	4.55 [17.85]	4.60 [17.80]	4.61 [17.79]	4.55 [17.85]	4.39 [18.01]
BH4	-	6.27 [16.23]	6.23 [16.27]	6.28 [16.22]	6.25 [16.25]	-	6.15 [16.35]
BH301	-	-	-	-	-	-	3.06 [19.84]

Table 2b: Summary of groundwater monitoring results (logger data)

Well	Groundwater Level between 29 September 2023 and 21 June 2024 (RL, m AHD)			Groundwater Level between 16 April 2025 and 28 May 2025 (RL, m AHD)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
BH1	17.51	18.00	17.58	17.88	18.23	18.10
BH2	17.52	18.02	17.83	17.80	18.21	18.04
BH3	17.60	18.00	17.79	18.06	18.29	18.18
BH4	16.07	16.33	16.19	-	-	-

5.1.3 Permeability testing

Rising / falling head permeability testing and slug testing were performed to assess the hydraulic conductivity of the siltstone on site. The rising / falling head permeability involves removing / filling a volume of water from / into a well and measuring the time it takes for the groundwater in the well to rise / fall. Slug testing involves lowering a slug (a non-permeable volume) below the standing water level in order to cause the groundwater level to rise and the rate at which the water level returns to the pre-test standing water level is recorded. Once the water level in the well has returned to the pre-test standing water level, the slug is removed from the well, which causes the groundwater level to drop equivalent to the volume of the slug, and

the rate at which the water level returns to its pre-test standing water level is recorded. Permeability tests were analysed with Hvorslev (1951) solution for slug testing interpretation.

Based on the investigation results, the permanent groundwater table is expected to occur within the siltstone bedrock. A total of 12 permeability tests were carried out in this water bearing lithological layer. A summary of the testing results is presented in Table 3. The detailed results of the permeability tests are attached in Appendix C.

Table 3: Interpreted permeability results

Well ID	Screen Interval (m)	Screened lithology	Test ID	Test Type	Interpreted Permeability (m/s)
BH1	1.00 – 11.61	Siltstone	1	Rising test	2.0×10^{-6}
			2	Slug test	6.0×10^{-6}
			3	Slug test	1.0×10^{-6}
BH2	1.20 – 12.10	Siltstone	1	Rising test	2.4×10^{-8}
			2	Rising test	1.3×10^{-6}
			3	Rising test	8.3×10^{-7}
BH3	0.90 – 10.51	Clay / Siltstone	1	Rising test	4.5×10^{-7}
			2	Rising test	5.8×10^{-6}
			3	Rising test	8.9×10^{-6}
BH4	2.60 – 15.18	Clay / Siltstone / Sandstone	1	Rising test	6.1×10^{-7}
			2	Rising test	1.1×10^{-6}
			3	Falling head	1.2×10^{-5}
Geometric Mean					**1.4×10^{-6}**

5.2 Contamination investigation results

5.2.1 Investigations

Detailed information and results of the contamination investigations on the site are provided in the preliminary site investigation (PSI) report prepared by Douglas (ref: 213805.03.R.001.Rev0 dated February 2024). Additional supplementary testing results are reported in Section 5.2.3, with summary results provided in Appendix D, field sheets in Appendix E, and laboratory documentation in Appendix F.

5.2.2 Site history and potential contamination sources

The PSI comprised a review of desktop information supplemented by sampling from hand tool boreholes, opportunistic testing from geotechnical test locations and additional groundwater and soil vapour sampling.

The site history and other desktop sources indicated a number of potential contamination sources were present. Following review of the results of the intrusive testing and analysis these were refined to include the following potential sources which are relevant to groundwater (i.e. potential for leaching from soils, or leaks / spills):

- Uncontrolled fill, potentially used for site levelling and previous development of the site.
    - COPC include eight heavy metals, total recoverable hydrocarbons (TRH), monocyclic aromatic hydrocarbons (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organophosphorus (OPP) and organochlorine pesticides (OCP), phenols, asbestos, and per- and poly-fluoroalkyl substances (PFAS).
- Former onsite Dry Cleaners.
    - COPC include chlorinated volatile organic compounds (VOC).
- Possible former on-site service station.
    - COPC include TRH, BTEX, metals (lead), PAH, VOC and phenols.

The location of the former dry cleaner and service station were indicated on previous historical business directory searches (refer Figure 2 below). The dry cleaner was indicated to have been located at the central western part of the site, and the service station at the corner of The Appin Way and North Terrace. Additional review of historical photographs suggested that the service station was present within the site at the south-east corner of the site. Other off-site sources were previously not considered significant risks based on either relative distance, or the location relative to the site (i.e. downgradient / cross-gradient).

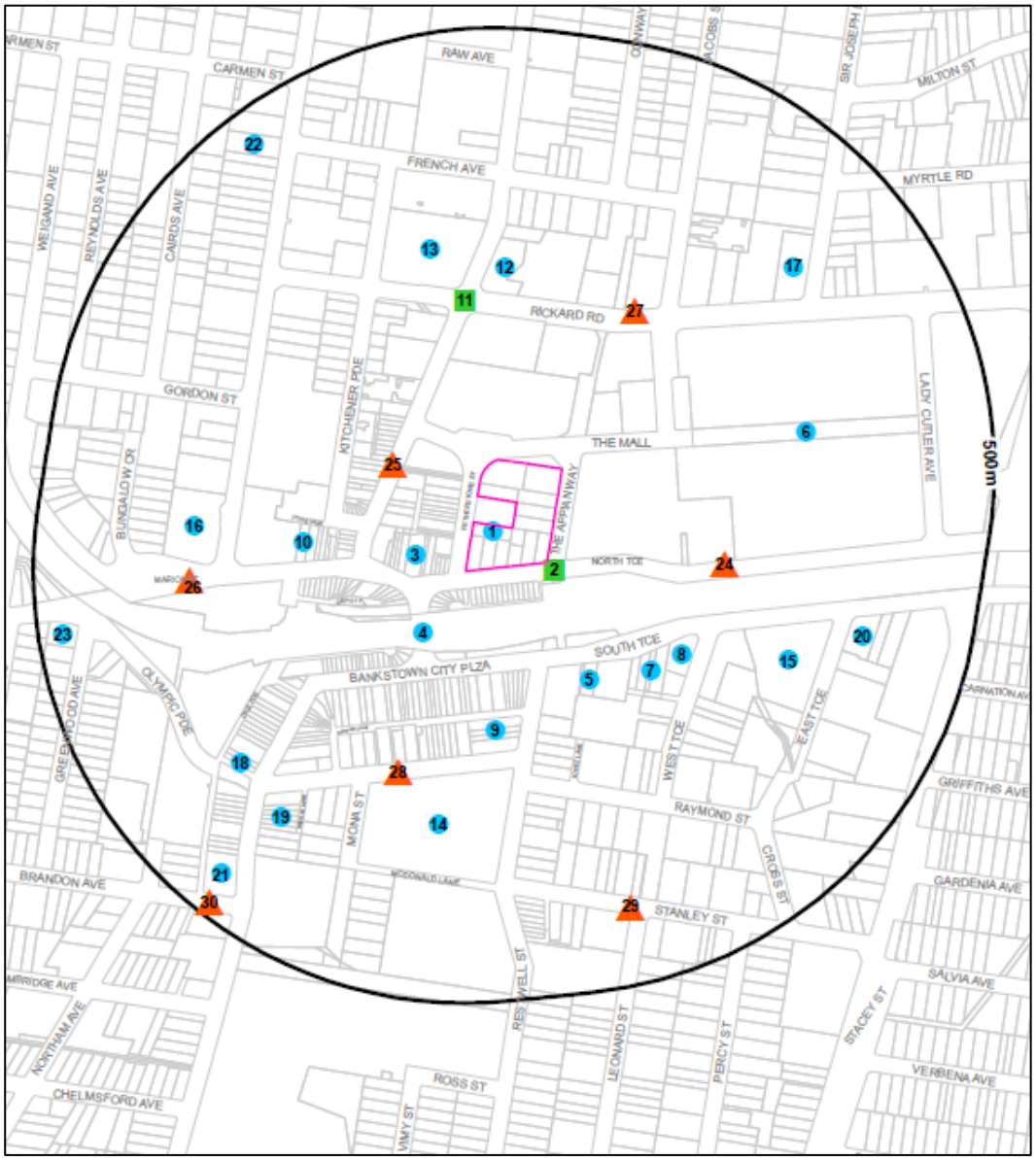

Figure 2: Dry cleaners, motor garages and service stations active between 1948 - 1993 within 500 m of the site (extract from the PSI investigation). On-site dry cleaner indicated at location (1), and the service station at location (2). Noting the pink boundary on Figure 2 shows the approximate location of the site, but is not the current site boundary).

5.2.3 Groundwater quality results

Test locations were undertaken as follows to target the following potential sources:

- BH1 / BH2 – approximate to inferred location of the former dry cleaner;
- BH301 - approximate to inferred location of the former service station (as limited by site access);
- BH3 / BH4 – upgradient monitoring locations;
- SV1-5 supplementary locations approximate to inferred location of the former service station (as limited by site access); and

- SV209-210 – previous PSI soil vapour test locations, targeting the approximate inferred location of the former dry cleaner.

Field measurement of stabilised groundwater parameters using a calibrated water quality meter indicated (current and previous investigations):

- pH ranging between 6.4-7.5;
- Turbidity ranging between 250-620 NTU;
- Dissolved oxygen – 6 – 15% saturation;
- Redox ranging -14 to 113 mV; and
- Electrical conductivity 15.8-2000 mS/cm .

No signs of non-aqueous phase liquids (NAPL) were observed visually or by electronic interface meter during sampling.

Samples were collected using low-flow (micro-purge) sampling techniques, with analysis conducted at a National Association of Testing Authorities (NATA) accredited laboratory.

The groundwater results have been assessed with respect to the adopted groundwater quality criteria, as are summarised in Table 4, in Section 11.1.

The analytical groundwater results from the PSI and supplementary investigation are summarised in Appendix D (Table D1). The results indicated no exceedances of groundwater quality criteria with the exception of:

- Copper: detected at 2 µg/L, 3 and 5 µg/L at boreholes BH 1, BH 4 and 301 respectively;
- Nickel: detected at 16 and 17 µg/L at BH 1; and
- Zinc: detected at 21 to 23 µg/L at BH 1 and BH 4 respectively.

These exceedances were noted to be within the hardness adjusted DGVs (excluding copper) for site water (noting hardness of the receiving body has not been assessed). Low level metals, typically including copper, nickel and zinc are in Douglas' experience typical of diffuse urban groundwater contamination resulting from road runoff, service leakage etc, and therefore when considered against the hardness adjusted values are not likely to be environmentally significant.

The following contaminant groups were recorded to be less than PQL in all samples: TRH; BTEX; PAH; OCP; OPP; PCB; VOC (including chlorinated VOC); and phenols.

Soil vapour testing results from the PSI (targeting the inferred location of the historical dry cleaner) were previously all below the Tier 1 screening criteria for BTEX, TCE, PCE and cis-1,2-DCE protective of residential land-uses. PCE was detected at one test location but at more than an order of magnitude below the Tier 1 screening criteria. BTEX was detected at low levels (below the screening criteria) at all soil vapour locations which may be indicative of the potential for minor concentrations to be present in groundwater (below the limit of detection in groundwater).

The recent supplementary vapour testing included field testing of five locations near the inferred location of the former service station as permitted by site access. Field photoionisation detector (PID) readings indicated low potential volatile contamination (<1 ppm). Laboratory analysis was

conducted from three locations (SV1-SV3, to maximise lateral coverage) with results summarised in Table D2, Appendix D. No air-phase TRH were detected above the limit of reporting. Toluene was detected above the limit of reporting from one sample location (SV1, at 2 µg/m^3) and trichloroethene in one sample from the same location (SV1 duplicate sample, at 2 µg/m^3). The detected concentrations are considered minor and are within orders of magnitude of screening criteria adopted in the PSI. However, the detections are indicative of the potential for impact in groundwater in areas not currently accessible for groundwater assessment.

The PSI concluded (in regards to groundwater) that whilst no significant impacts from VOC have been detected in groundwater / soil vapour there were parts of the site which were not previously tested (e.g. south-east corner, location of possible former service station for potential TRH, BTEX, metal, VOC and phenols impacts).

The supplementary groundwater and vapour testing has not identified TRH or VOC in groundwater, and only minor indicators of potential groundwater contamination based on the soil vapour results.

Noting limitations on access for groundwater wells it is considered that localised impacts on groundwater may exist. In addition, any redundant / abandoned in ground infrastructure (e.g. abandoned underground storage tanks), could also act as a local source.

Overall, it is considered that there is a low risk of significant contamination in groundwater, and further testing is currently recommended to inform disposal and treatment requirements for the groundwater. Monitoring of groundwater quality for disposal should include the respective contaminants of concern in an analytical regime (e.g. risk of initial drawdown of contaminated groundwater within tank pits).

Assessment of quality assurance and quality control of the supplementary investigation data is included in Appendix G.

6. Conceptual hydrogeological model

The site is underlain by fill, residual clay and Ashfield Shale. The permanent groundwater table is expected to occur within the Ashfield Shale along defects where secondary permeability has been enhanced (e.g. in fractures and cracks).

Free groundwater was not encountered during augering of the near-surface fill and clay at the boreholes. Depths to groundwater were measured in the monitoring wells following installation and well development. Water levels measured in the monitoring wells ranged between RL 16 m and RL 20 m. The groundwater is expected to flow to the south towards Salt Pan Creek.

It should be noted that groundwater levels fluctuate with climatic variations and other factors (e.g. dewatering of adjacent basements). Typically, water levels will temporarily rise during periods of heavy or prolonged rainfall and fall during dry periods.

It is expected that water inputs to the ground profile beneath the site include:

- Rainfall infiltration on the site and surrounds, including water flowing downslope laterally through the natural soils and bedrock from areas of higher topography; and

- Possible anthropogenic recharge from seepage from nearby leaking water mains and/or stormwater pipes, garden irrigation etc.

Water outputs or losses from the ground beneath the site include:

- Evapotranspiration from the vegetation across the surface; and
- Nearby dewatering projects or drained basements, if applicable.

7. Proposed development

It is understood that the proposed development will include the demolition of the existing buildings and construction of three high-rise towers over a shared two-level basement. Basement 2 is proposed to be slightly stepped in three finished floor levels (FFLs), at RL 16.0, RL 15.5 and RL 14.8, respectively. The lowest basement FFL of RL 14.8 m will require bulk excavation to about 8-10 m depth. The bulk excavation levels have been assumed to 0.3 m below the FFLs, to allow for the construction of a drainage layer and concrete slab.

It is understood that the basement may be designed as a 'drained' basement, subject to review and approval from Council and relevant authorities. It is expected that the excavation will be supported by soldier piles with shotcrete infill panels and that the inflows, both in the short and long term, should be readily controllable by pumping from sumps.

8. Groundwater modelling

8.1 Methodology

Numerical modelling was undertaken to assess the potential inflow rates into the proposed basement 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 3D finite element software PLAXIS 3D (V22). Transient flow conditions were modelled over a 12-month period to assess inflow rates during construction and the long-term 'steady-state' flow for the 'drained' basement were modelled in the analysis.

8.2 Model geometry

For the purpose of the assessment, Douglas developed on 3D geometric model, horizontally extending approximately 600 m each way from the basement footprint. The modelled ground surface slope from RL35 m to RL10 m towards the south (in x-direction). The base of the model was terminated at RL-50 m. The model set-up is presented in Figure 3.

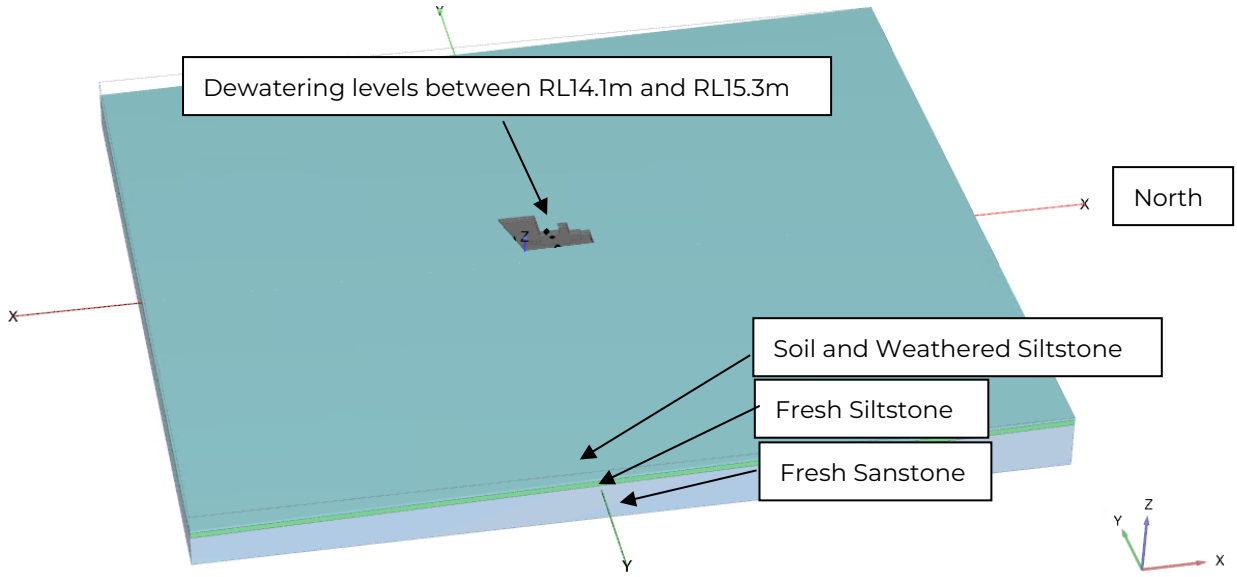

Figure 3: Model set-up

8.3 Model set-up

8.3.1 Model layers

Three hydrogeological layers were modelled by combining multiple materials (in Table 1) with similar hydraulic properties (permeability and storage) into one layer. The layers were assigned as saturated / unsaturated materials in the hydrogeological model analysed using PLAXIS 3D.

Model layers and adopted hydraulic properties are presented in Table 3. The layers were simplified with uniform thickness based on the investigation results.

The hydraulic properties for the clayey soil were conservatively selected based on ranges of values documented in the available literature (e.g. Fetter 1994). It is considered that the impact of the selection of the properties in this layer on the analysis results would be minimal, as the groundwater table does not intersect this layer.

Permeability of the fresh siltstone were selected based on the results of the permeability testing. The anisotropy ratio of the permeability of the fresh siltstone was estimated based on the approximate amount of the horizontal and vertical defects observed in the boreholes.

The same horizontal permeability value as the siltstone was adopted for the fresh sandstone. 10% of the anisotropy ratio of the siltstone was adopted for the fresh sandstone. This is considered relatively conservative based on that the sandstone is typically slightly fractured to unbroken.

The water retention and unsaturated permeability characteristics in the unsaturated zones were modelled using the Van Genuchten method with different Soil Classes (USDA). The combination of the Soil Class and Porosity determines the storage of the modelled layer. An equivalent storage of approximately 15% was adopted for the siltstone and sandstone.

Table 3: Model layers and adopted hydraulic properties

Layer	Material	Layer Thickness (m)	Saturated Kh (m/s)	Anisotropy Ratio (Kv/Kh)	Porosity	USDA Soil Class [1]	Material Model
1	Soil and weathered siltstone (Units 1 to 3	4	1.0×10^{-6}	1	0.4	Silty clay	Unsaturated / saturated
2	Fresh siltstone (Unit 4 and 5)	8.5	1.4×10^{-6}	0.33	0.2	Sand	Unsaturated / saturated
3	Fresh Sandstone (Unit 6)	60	1.4×10^{-6}	0.03	0.2	Sand	Unsaturated / saturated

Note: 1 – USDA Soil Class for simulating unsaturated flow behaviour.

8.3.2 Initial groundwater elevation and boundary conditions

As the proposed development is located within an urban setting with parks around the site, an annual rainfall of 1.2 m and net infiltration percentage of 3% was assigned as water influx over the ground surface.

The pre-development water level is calibrated by adjusting the far-field water head to simulate the groundwater levels at approximately RL 18.2 m near the centre of the site. Groundwater fluctuations are impacted by climate change, unpredictable extreme weather events and the dewatering of any surrounding basements.

8.3.3 Basement design and dewatering

The proposed soldier pile walls (with strip drains) and the exposed rock faces were assumed to be fully drained and simulated as 'Surface Drains' in PLAXIS 3D with zero hydraulic pressure head over the full height of sidewalls. It is assumed that subsoil drainage layer and the sumps located in the basement will lower the water head to 0.5 m below the BELs.

8.3.4 Simulation

To simulate the temporary dewatering required during construction, transient flow conditions were modelled in the analysis. For the purpose of the analysis, excavation was undertaken in a single stage (i.e. instantaneously) and the subsequent temporary dewatering period was assumed to be up to 12 months, subdivided into multiple time intervals.

The analysis was also run under 'steady state' conditions for the long term (i.e. assuming permanent drained basement, after construction).

8.4 Modelling results

8.4.1 Groundwater inflow

The inflow rates obtained from the modelling represent the estimated total rate of groundwater flowing into the excavation and the volume (per unit time) requiring extraction via the dewatering system, in order to dewater the basement during and after construction.

The estimated inflows from the analysis for the first year (i.e. during construction) and long term are summarised in Table 5.

Table 5: Simulated inflow results for dewatering level at RL 14 m

Elapsed Time	Baseline case – predicted inflow	
	m^3/day	Cumulative (ML)
7 days	93.5	0.7
14 days	81.7	1.3
30 days	67.0	2.5
60 days	54.4	4.3
90 days	47.5	5.8
180 days	38.0	9.7
365 days	32.2	16.1
Long term	m^3/day	ML/year
	19.2	7.0

The results of the groundwater inflow analysis indicate:

- For dewatering levels nominated in Section 8.3.3, inflow of about 16.1 ML in the first year of construction; inflow will decrease in the long term after construction, to about 7.0 ML/year.

The inflow rate presented above is a prediction only and may vary significantly to the assumptions presented. The actual flow rate will only be known once the excavation is completed, and the inflow can be observed and measured. Appropriate planning should be in place to monitor and compensate for greater variations in actual inflows.

8.4.2 Drawdown and settlement

For the drained basement, the groundwater levels are anticipated to be lowered by a maximum of 2.5 m immediately outside the excavation and gradually reduces to negligible (<0.5m) at approximately 300 m radius from any edge of the excavation.

Figure 4 shows the modelled groundwater drawdown contours with a 0.5 m interval. Groundwater drawdown occurs within the fresh siltstone units of a high deformation modulus and therefore is not expected to result in any significant settlement on surrounding sites due to drawdown of the pre-development groundwater table.

In particular, the adjoining building with a single level basement at 3-7 Featherstone Street is expected to be founded in rock of at least medium strength. The impact of the groundwater drawdown due to the proposed drained basement on this building would be negligible. The shoring system of the development will be designed to make sure the foundation of the neighbouring building is not undermined.

The existing basement on the site will be demolished prior to the excavation of the site.

Figure 4: Modelled groundwater drawdown contours (0.5 m interval)

9. Potential effects of dewatering

9.1 Aquifer interference policy considerations

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.

The site is underlain by shallow soils and siltstone of low permeability with potentially low yield. The groundwater system is therefore considered to be a 'less productive groundwater source' as outlined in the AIP.

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

- less than or equal to 10% cumulative variation in water table 40 m from any high priority groundwater dependent ecosystem (GDE), high priority culturally significant site, or less than a 2 m decline at any water supply work;
- a cumulative pressure head decline of not 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.

9.2 Risk assessment

An assessment of the potential effects of dewatering on neighbouring properties and groundwater receptors has been summarised in Table 6.

Table 6: Assessment of potential effects of dewatering

Item	Comment
Proximity of Groundwater Dependent Ecosystems (GDEs)	No GDEs mapped within 1 km of the site. The predicted drawdown reduced to <0.5 m at about 300 m from the site. The impact on Salt Pan Creek is expected to be negligible.
Water supply losses by neighbouring groundwater users	A review of registered bores indicated that there is no registered groundwater within a 500 m radius to the site.
Potential subsidence of neighbouring structures	Drawdown is expected to result in small or negligible subsidence of neighbouring structures / pavements since the groundwater drawdown is expected to occur with rock units with high deformation modulus.
Mounding of water upgradient of the tanked basement in the long term	As the basement is proposed to be drained, mounding of groundwater is not expected upgradient of the site.
Groundwater Quality and Contamination risk	Refer Section 5.2. Current data does not indicate a risk of widespread, significant groundwater contamination. Based on results groundwater treatment is recommended prior to discharge to inform disposal and treatment requirements. Initial dewatering may also draw in localised contamination from suspect abandoned underground infrastructure associated with former site activities (refer Section 5.2.2). Nominated discharge limits are included in Section 11.1
ASS	Refer Section 3.4. No management of ASS is considered to be required during dewatering.

Based on the predicted drawdown profile and the long distance (>1 km) to surrounding water supply works and GDEs, it is anticipated that the predicted impacts will be considered as acceptable in accordance with the NSW Aquifer Interference Policy requirements.

10. Groundwater disposal and council requirements

All collected groundwater during dewatering requiring disposal will need to be tested against the requirements of the receiving authority. Disposal to stormwater will require Council approval and be subject to their water quality requirements for discharge to stormwater.

Ongoing monitoring of groundwater quality will be required to check that the groundwater quality complies with the nominated criteria for disposal. Suggested monitoring and reporting requirements are given in the following section (Section 11).

Where groundwater does not comply with the nominated requirements some form of groundwater treatment will be required prior to disposal. The treatment system will need to be determined and adjusted based on the groundwater test results prior to disposal and is recommended to consider a combination of the following:

- Use of settlement tanks with addition of a flocculation agent to control heavy metals;
- Use of oil-water separators / carbon filters to control hydrocarbons;
- pH adjustment; and
- Use of additional specialist treatment systems (as required) to control heavy metals, hydrocarbons, VOC etc.

Based on the potential contamination sources, it is considered there is a risk of localised contamination (e.g. within or backfill surrounding abandoned underground storage tanks) which may be drawn into the treatment system during initial drawdown. Any treatment system should therefore anticipate the requirement to treat TRH / VOC, until results can demonstrate a reduced treatment system is suitable.

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.

11. Monitoring and reporting

The suggested monitoring programme and associated reporting during excavation and construction works on-site is shown in Table 7. Options have been provided depending on whether batch treatment and disposal, or continuous treatment and disposal is undertaken.

The proposed monitoring program includes recommendations for the following to be undertaken prior to commencement of dewatering / discharge:

- Installation of three additional groundwater wells around the basement perimeter to facilitate long-term groundwater level monitoring. Preferably the locations will include areas previously not accessible for contamination assessment to assess residual contamination risks;

- Further assessment of groundwater quality as part of the above to assess risks posed by the former on-site service station and dry cleaner; and
- Undertaking a trial run of the proposed treatment system (e.g. discharge to holding tank) to assess effectiveness of the system to meet required discharge quality.

Table 7: Monitoring and reporting requirements

Item	Monitoring Required	Monitoring Frequency, Reporting and Notes
Measure groundwater levels during construction	Install and utilise at least 3 wells around the perimeter of the basement for measurement of groundwater levels. The locations will be subject to access and approvals and will be determined prior to construction.	Daily for the first two weeks. After steady groundwater conditions are established then weekly. This can be relaxed to monthly once water levels have stabilised. Preferably dataloggers should be installed. Groundwater level trigger levels and response plan as follows: • Drawdown less than 80% of the predicted values: proceed as normal • Drawdown greater than 80% but less than 100% of the predicted values: increase monitoring frequency, notify geotechnical consultant and proceed as per geotechnical advice. • Drawdown greater than 100% of the predicted values: immediately cease all works and notify geotechnical consultant and all stakeholders. Await advice from geotechnical consultant prior to recommencing works.
Treatment system trial	Conduct trial run of the proposed treatment system prior to direct discharge. Analysis of samples from the recommended 3 additional long-term monitoring wells Following initial results (and revision of treatment system design, if required), sampling the inlet and outlet of the treatment system for the following: • Heavy Metals (including ferrous iron); • TRH / BTEX; • PAH; • Phenols; and	Treatment system outlet to be temporarily held in a buffer / holding tank prior to confirming compliance with discharge quality requirements. Secondary COPC to be refined based on further required contamination investigations (soils).

Item	Monitoring Required	Monitoring Frequency, Reporting and Notes
	• VOC. Secondary COPC / parameters including: • OCP/OPP/PCB; • Major Nutrients; • Microbiology; and • PFAS. Physiochemical parameters (field monitoring or laboratory analysis): • pH & conductivity; • Suspended Solids; • Turbidity; and • Dissolved Oxygen Levels.	
Visual Inspection	No visible oil and grease, 'sheen' and/or no significant discolouration or odours. If any of the above signs are noted, then any discharge will be suspended until further analytical testing is completed.	Inspections twice daily by contractor.
Ground Water Quality Sampling and Testing	Sampling and testing of water from wells and the excavation, or at the point of discharge. Contaminant and physical properties tested to be nominated by the authority accepting water but to include: Potential contaminants based on current monitoring results: Key COPC including: • Heavy Metals; • TRH / BTEX; and • VOC. Potential secondary COPC including • Phenols; • PAH; • OCP/OPP/PCB; • Major Nutrients; • Microbiology; and • PFAS.	Treatment system outlet to be temporarily held in a buffer / holding tank prior to confirming compliance with discharge quality requirements. pH and turbidity to be measured daily. Based on current risks of potential localised contamination (e.g. former dry cleaner, service station, potential for abandoned UST) monitoring of discharge water quality is recommended every second day for the first week. Otherwise, twice weekly monitoring and reporting of results for the duration of dewatering, or until further review indicates lower or higher frequency warranted. The need for testing secondary COPC may be reviewed based on initial results (i.e. below discharge limits or limit of reporting) during initial drawdown.

Item	Monitoring Required	Monitoring Frequency, Reporting and Notes
	Physiochemical parameters: • pH & conductivity; • Hardness (to establish suitability of previous hardness adjusted metals criteria); • Suspended Solids; • Turbidity; and • Dissolved Oxygen Levels.	Screening criteria to be determined by the approval authority but may initially be anticipated to include the investigation levels outlined in Section 11.1.
Quality Control Sampling	Collection of replicate sample (outlet of collection / treatment system) to verify quality of laboratory results.	Monthly samples, or one in 10 samples (whichever is the lesser). Inclusion of results in a final water quality monitoring report (i.e. as outlined in a DMP).
Groundwater inflow rates	Groundwater inflow to be measured in collection tanks, of a pre-determined size or using a calibrated flow meter connected to the dewatering system.	Twice daily, or once collection point is filled (whichever is more frequent), for the first two weeks. After steady groundwater inflow rates are established then daily. Weekly reporting of inflow rates.
Quantity of water disposed off-site	Calibrated flowmeter connected to any pump-out system.	Continuous monitoring of pump-out volumes (or measurement of batch volumes prior to discharge). Weekly reporting of volumes. Inclusion of results in a final water quality monitoring report (i.e., as outlined in a DMP).

11.1 Groundwater quality criteria

Proposed groundwater discharge criteria are given in Table 8 and are based on ANZG (2018) and HEPA (2025) criteria protective of freshwater ecosystems, 95% level of protection (99% level of protection for bioaccumulation or chronic toxicity), and physiochemical parameters based on indicative background conditions for lowland rivers in NSW from ANZECC (2000).

Analytes without criteria provided in national guidance documents (e.g. TRH) may consider the laboratory limit of reporting as an initial screening value. Further reference may be given to other jurisdictions for comparative criteria if required, e.g. US EPA.

The actual disposal criteria will depend on any additional requirements of the approval authority.

Table 8. Proposed groundwater discharge criteria

Analyte / Parameter	Screening value (µg/L unless otherwise stated)
Metals / Metalloids	
Arsenic (III) / (V)	24 / 13
Cadmium	0.2 (2)
Chromium (III) / (VI)	3.3 / 1
Copper	1.4
Lead	3.4 (91.2)
Mercury (inorganic)	0.06
Nickel	11 (99.4)
Zinc	8 (72.3)
BTEX	
Benzene	950
Toluene	180
Ethylbenzene	80
m-Xylene	75
o-Xylene*	350
p-Xylene*	200
PAH	
Naphthalene	2.5
B(a)P	0.1
Anthracene	0.4
Phenanthrene	2.0
Fluoranthene	1
VOC	
1,1,1-trichloroethane	270
1,1,2,2-tetrachloroethane	400
Tetrachloroethene	70
1,1,2-trichloroethane	6500
1,1,2-trichloroethene	330
1,1-Dichloroethene	700
1,2,3-trichlorobenzene	10
1,2,4-trichlorobenzene	170

Analyte / Parameter	Screening value (µg/L unless otherwise stated)
1,2-dichlorobenzene	160
1,2-dichloroethane	1900
1,2-dichloropropane	900
1,3-dichlorobenzene	260
1,3-dichloropropane	1100
1,4-dichlorobenzene	60
Tetrachloromethane (carbon tetrachloride)	150
Trichloromethane (chloroform)	370
Isopropylbenzene (cumene)	30
Chlorobenzene	55
Phenols	
Phenol	320
OCP	
Aldrin	1
DDT	0.006
Endrin	0.01
Heptachlor	0.01
Hexachlorobenzene	0.05
Lindane	0.07
Methoxychlor	0.005
OPP	
Azinphos methyl (Guthion)	0.02
Chlorpyrifos	0.01
Diazinon	0.01
Dimethoate	0.01
Fenitrothion	0.1
Malathion	0.05
Parathion	0.0007
PCB	
Arochlor 1242	0.3
Aroclor 1254	0.01

Analyte / Parameter	Screening value (µg/L unless otherwise stated)
PFAS	
PFOS	0.00023
PFOA	19
Physiochemical Parameters	
Conductivity	200 - 300 µs/cm
pH	6.5 – 8.5 pH units
Dissolved Oxygen	60 - 120 % saturation
Turbidity	50 NTU
Total Suspended Solids	< 50 mg/L

NOTE: values in brackets provide hardness adjusted values based on extremely hard' (400 mg/L $CaCO_3$) conditions

11.2 Personnel and responsibilities

Table 9 below outlines the proposed project personnel and relevant responsibilities as part of the management plan.

Table 9: Nominated personnel and responsibilities

Role	Organisation	Responsibilities
Site Manager / Contractor	TBC	Routine visual inspection. Monitoring / recording of dewatering / discharge volumes. Maintaining any unexpected / contingency records.
Dewatering Contractor	TBC	Design / specification and ongoing maintenance of the dewatering system.
Geotechnical Consultant	Douglas Partners – 02 9809 0666	Groundwater level monitoring and review of disposal volumes. Assist in preparation of the dewatering completion report.
Environmental Consultant	TBC	Water quality sampling (analysis using NATA accredited laboratories). Interim advice for each sampling event to confirm (or otherwise) compliance with discharge requirements. Quality control sampling. Assist in preparation of the dewatering completion report.

11.3 Contingency plan

If the pre-construction testing indicates the proposed disposal option (stormwater) is not practicable then consideration of other disposal options must be given, including off-site disposal as liquid waste or under a trade waste agreement (refer further comment below).

If any non-conformance is encountered, then disposal of water to stormwater will be suspended. The following general contingency plan will be followed:

- Suspend all discharge into the nominated stormwater disposal point, and any dewatering into the inlet of the treatment system;
- Notify the Site Manager / Contractor and Environmental Consultant;
- Environmental Consultant to inspect the site / unexpected finds and collect additional water quality samples as advised;
- Environmental Consultant to liaise with Site Manager and Water Contractor if any adjustments / modifications to the treatment system may be required; and
- Confirmation by the Environmental Consultant that disposal may resume (e.g. upon receipt of laboratory results).

During suspension of discharge to stormwater options for managing water from the dewatering pumps should consider:

- Buffer tanks in the treatment system (inlet / outlet) to allow temporary holding of water. Noting that depending on available space and flows only limited storage may be practicable; and
- Off-site treatment as liquid waste to an appropriate receiving facility.

Consideration of disposal under a trade waste agreement may be required if on-site treatment or off-site disposal as liquid waste are not feasible. For example, where on-site treatment systems cannot reasonably treat the volume / level of contaminants, or off-site disposal volumes are prohibitive. Disposal under a trade waste agreement would require further consultation with Sydney Water and may include additional disposal requirements (treatment, record keeping etc.).

12. Comments

From a geotechnical and hydrogeological point of view, it is considered that a drained basement with the proposed construction is feasible, with “no more than minimal harm” to surrounding aquifer, groundwater systems, users or neighbours’ properties. This will be subject to review and approval from Council and relevant authorities.

Based on the results of the numerical analysis, the expected long-term inflow rates are about 7.0 ML/year for the proposed 2-level basement. Based on the inflow estimate of over the 3 ML/year exemption threshold, the proposed drained basement requires a Water Supply Works Approval (WSWA) and a Water Access License (WAL) from WaterNSW and, assuming that the groundwater take is approved.

The groundwater inflow is sensitive to the modelled aquifer permeability. The adopted permeabilities of the fresh rocks in the analysis was based on the geometric mean of the results of permeability tests and observed defects in the boreholes. The adopted value is consistent with published data and Douglas experience in similar geology. A sensitivity analysis was carried out ignoring the fresh unbroken sandstone layer and extending the fresh fractured siltstone to the base of the model. The results of the sensitivity analysis predicted a long-term inflow rate of about 12.9 ML/year.

Given that groundwater is expected to flow through fractures and defects within the bedrock, it is likely that both the permeability and storage will vary significantly across the site. There is a reasonable degree of uncertainty associated with the extent and connectivity of the fractures at the site. A contingency plan of targeted grouting or similar might be required to manage higher inflows if open defects or fractured bands are encountered by the excavation.

From a contamination perspective, disposal of the groundwater should be managed appropriately with the relevant authorities, and it is likely that some level of treatment of the groundwater will be required prior to disposal, which is typical. The form of treatment required should be planned based on additional groundwater testing results, as recommended herein.

This report has been prepared with reference to *Minimum requirements for building site groundwater investigations and reporting* (NSW DPE, 2022).

13. Limitations

Douglas has prepared this report for this project at 83-99 North Terrace, Bankstown NSW in accordance with Douglas' proposal 213805.02.P.002.Rev0 dated 8 February 2024 and acceptance received from Craig Sanders. This report is provided for the exclusive use of Altis ARET Sub Trust 21 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's field testing has been completed.

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

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

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

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

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

Appendix A

About this Report

About this Report

November 2023

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

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

Reports

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

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

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

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

continued next page

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

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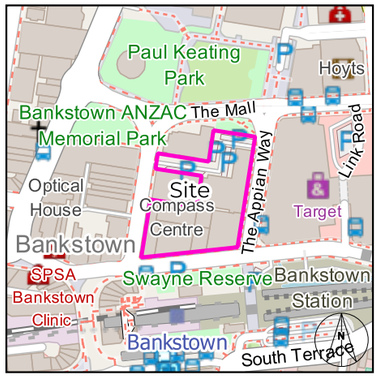
Appendix B

Drawings



SITE LOCATION

LEGEND

- Site Boundary
- Borehole, CPT and Groundwater Well
- Borehole and Groundwater Well
- Borehole and Groundwater Well
- Soil Vapour Pin

0 5 10 15 20 25 m

NOTE:
1. Drawing projection in GDA94 / MGA zone 56, adapted from aerial imagery from metromap.com
2. Some test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage, other test locations were estimated based off site features

Douglas PARTNERS

CLIENT: Essence Project Management		
OFFICE: Sydney	DRAWN BY: NW	
SCALE: 1:600 @A3	DATE: 06.June.2025	

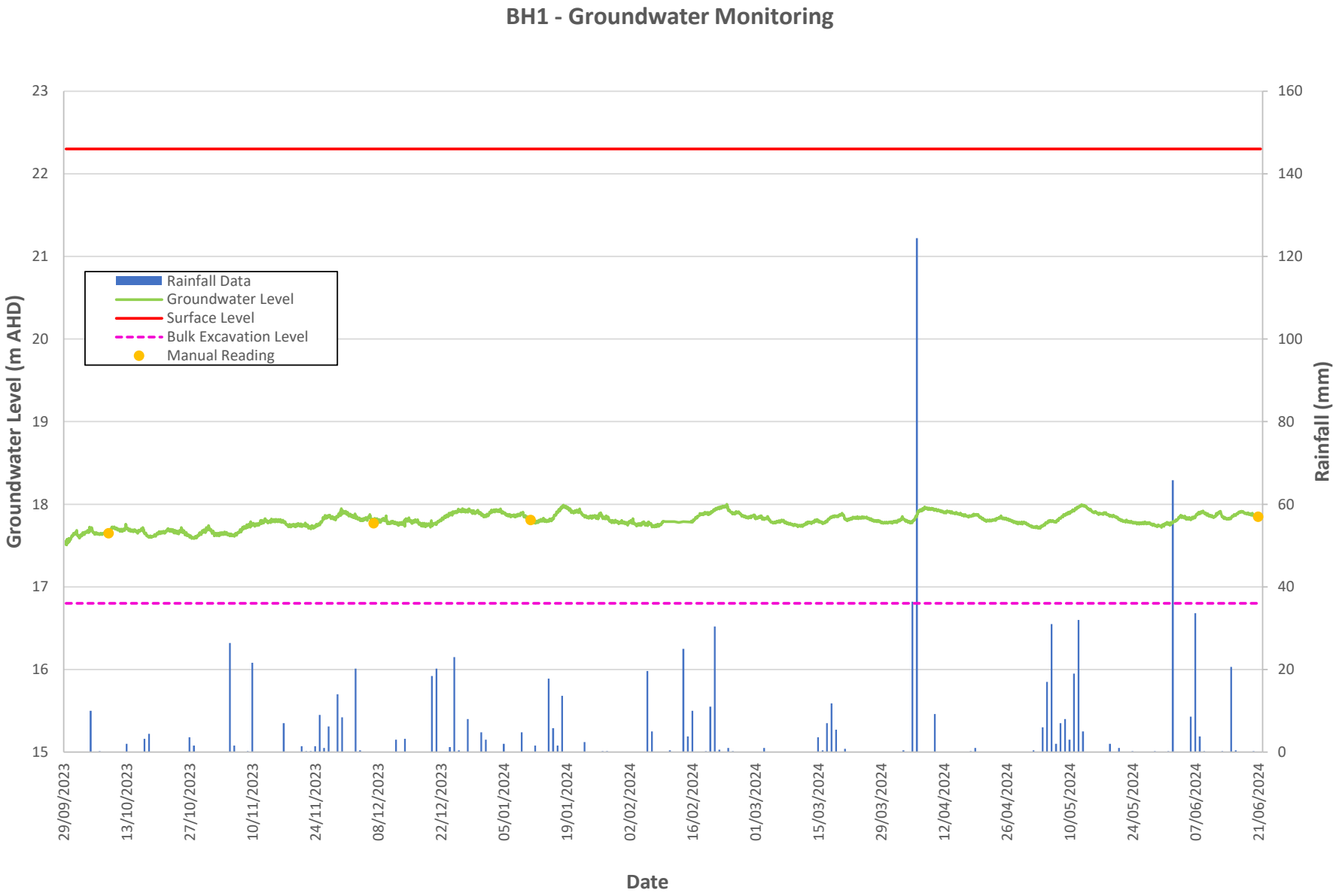
TITLE: **Test Location Plan**
Propsed Compass Centre Redevelopment
83-89 North Terrace, Bankstown, NSW

N

PROJECT:	213805.04
DRAWING No:	1
REVISION:	0

Appendix C

Field Work Results


BH1 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
23
22
21
20
19
18
17
16
15
160
140
120
100
80
60
40
20
0
29/09/2023
13/10/2023
27/10/2023
10/11/2023
24/11/2023
08/12/2023
22/12/2023
05/01/2024
19/01/2024
02/02/2024
16/02/2024
01/03/2024
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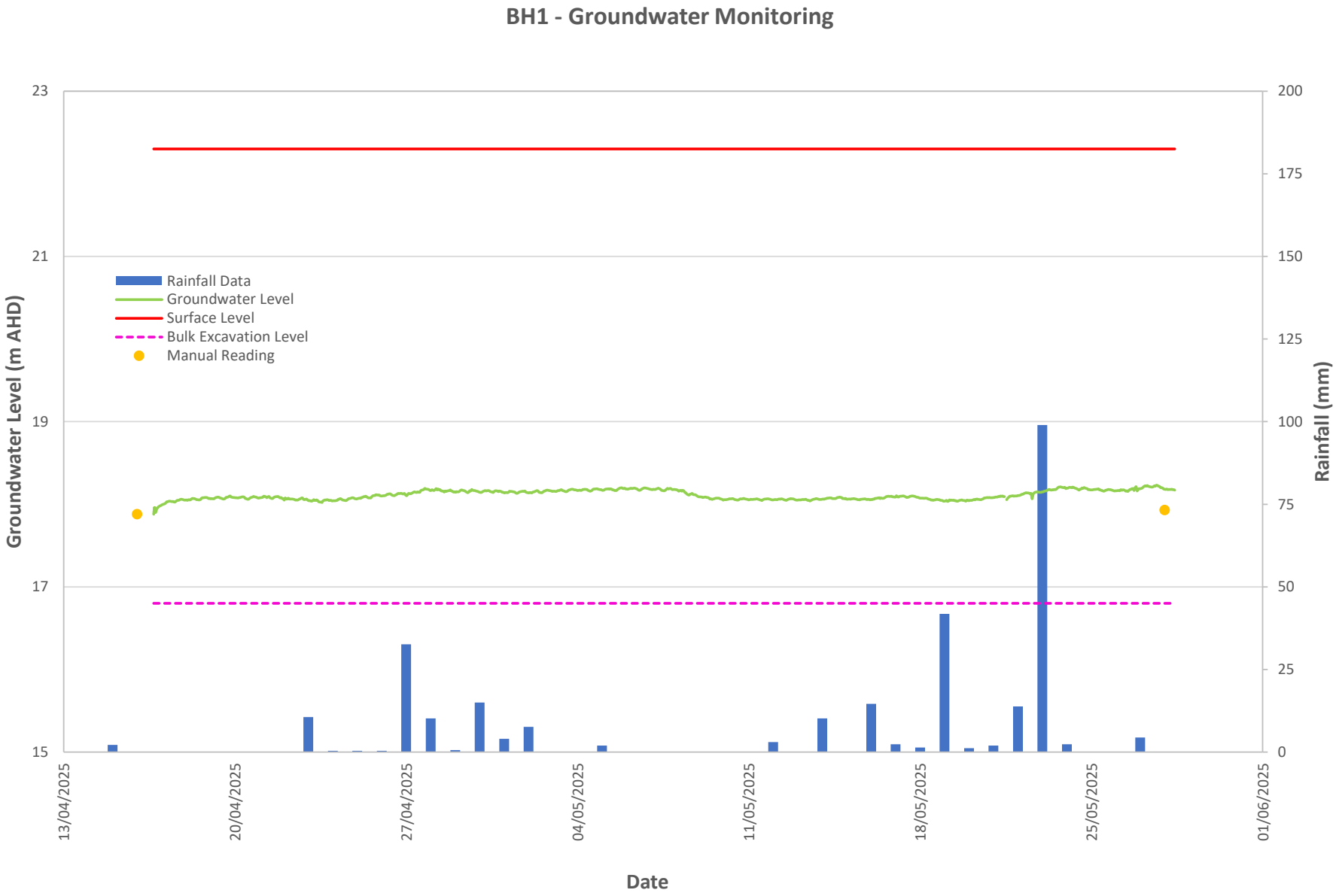
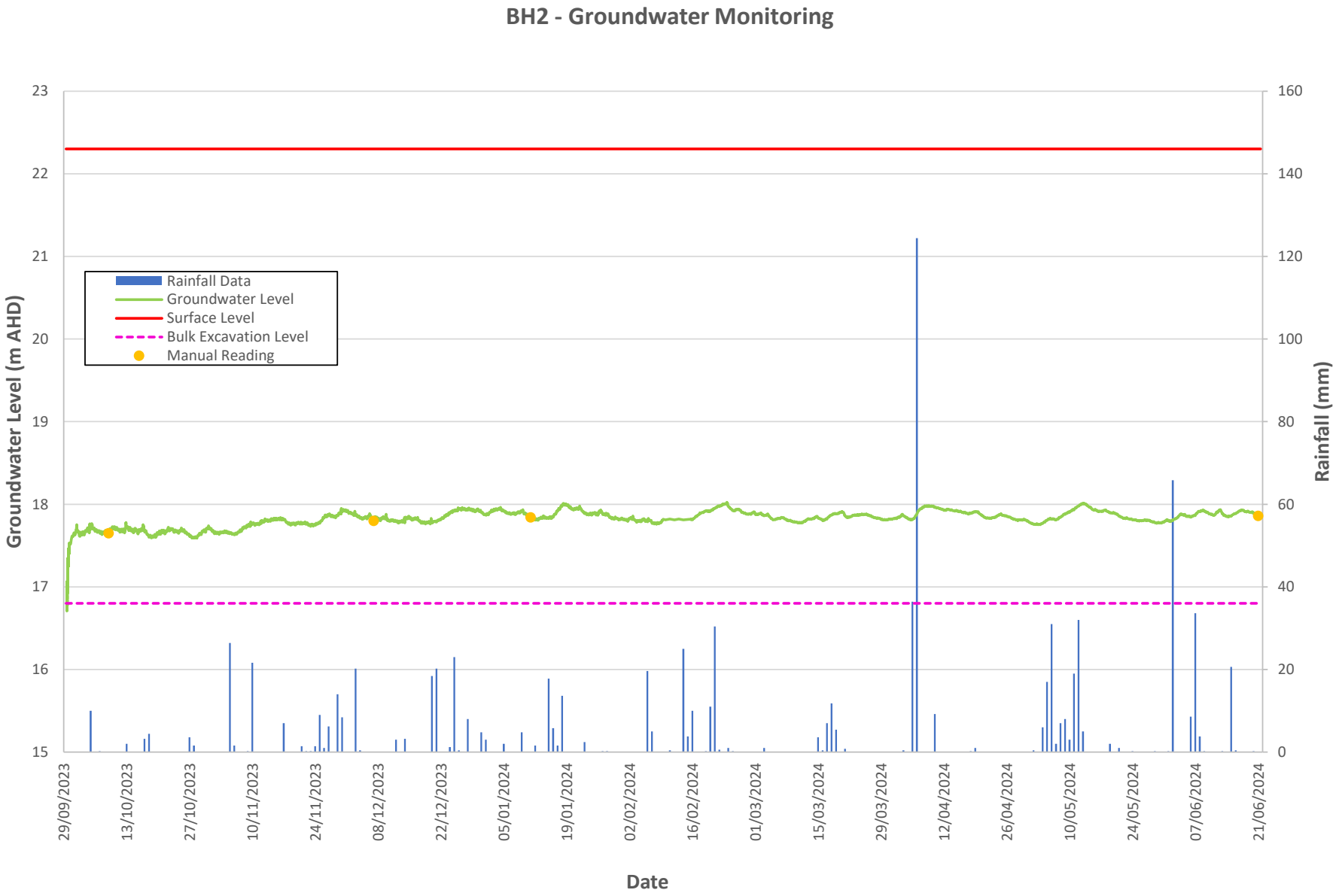
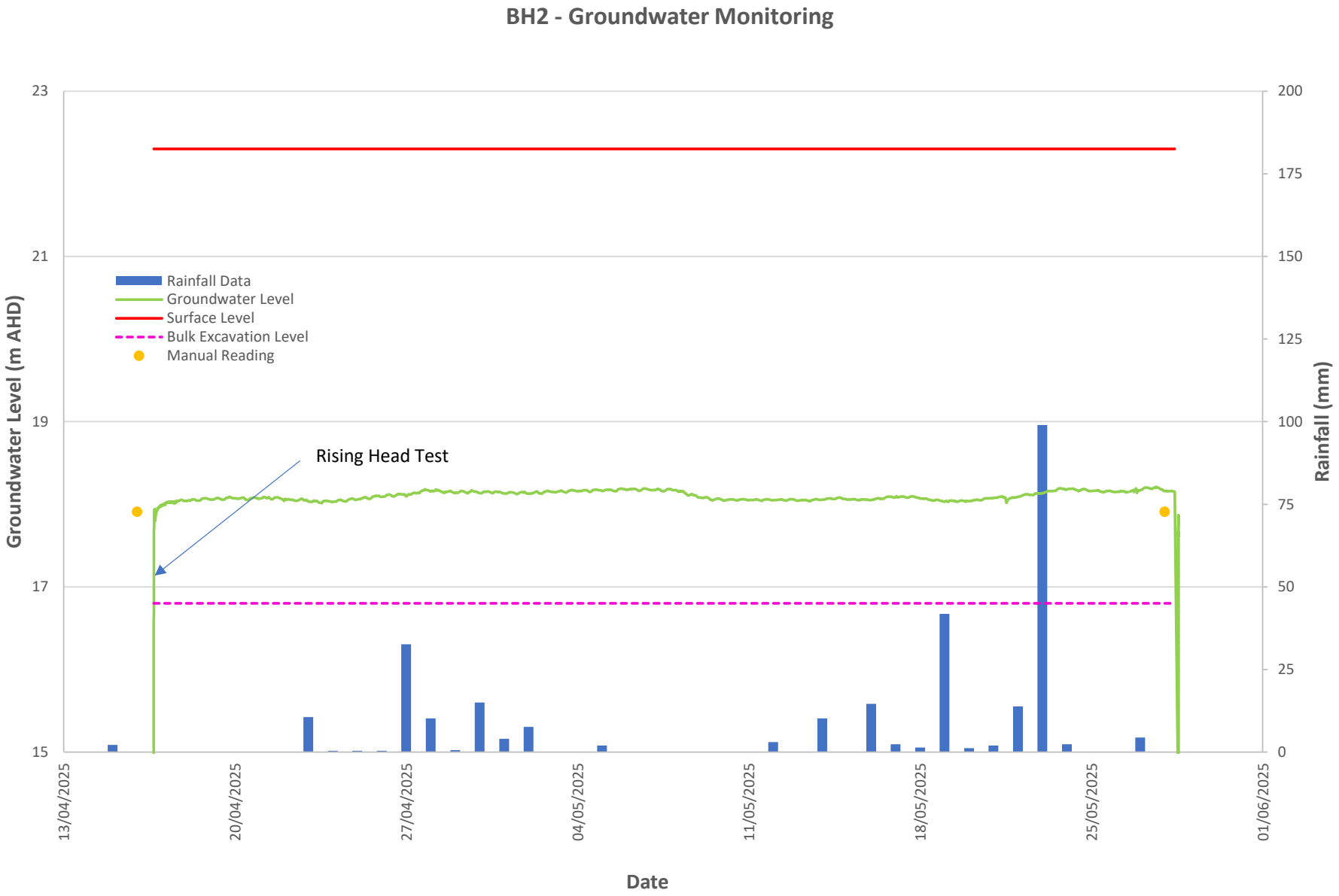
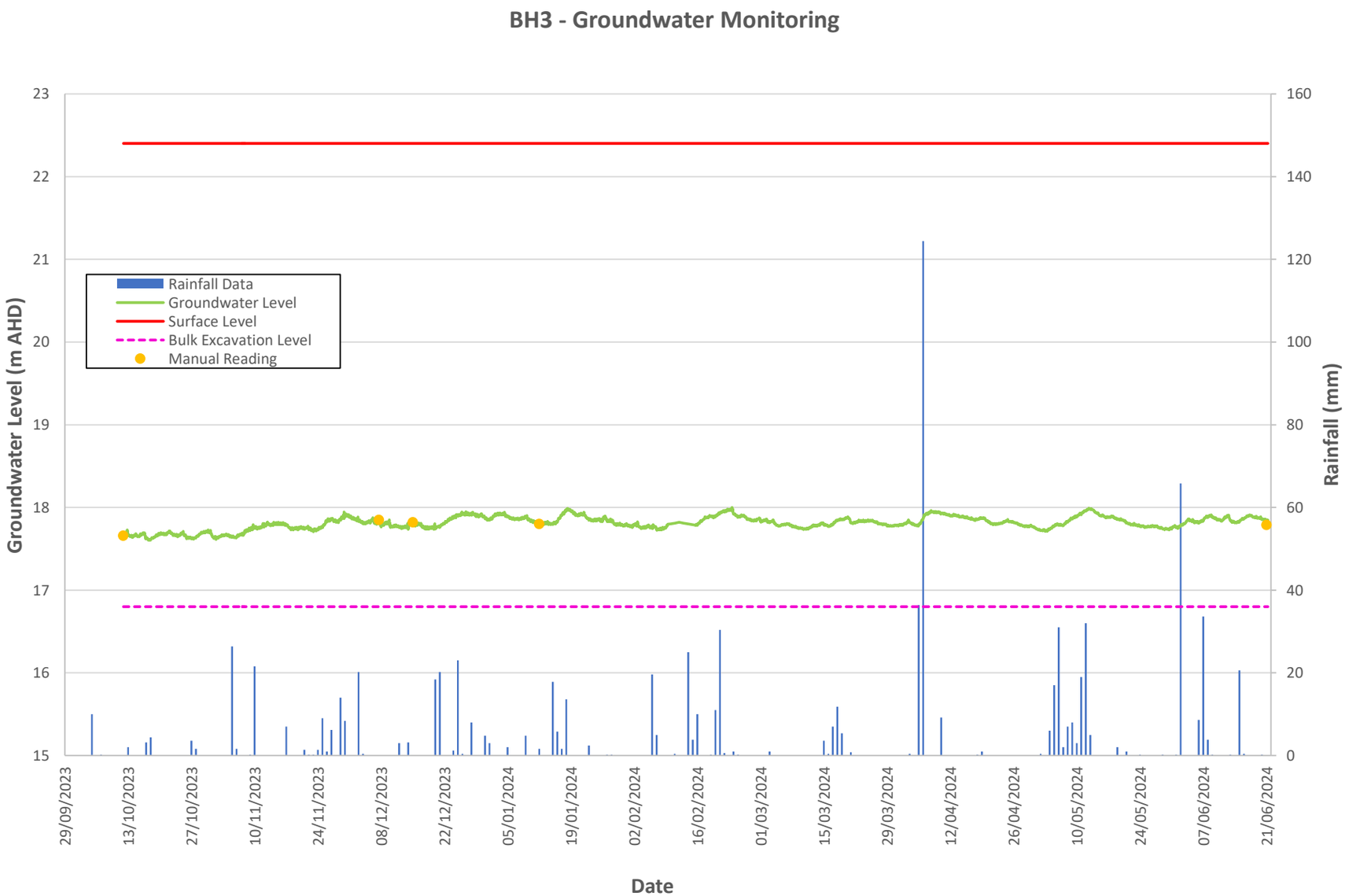
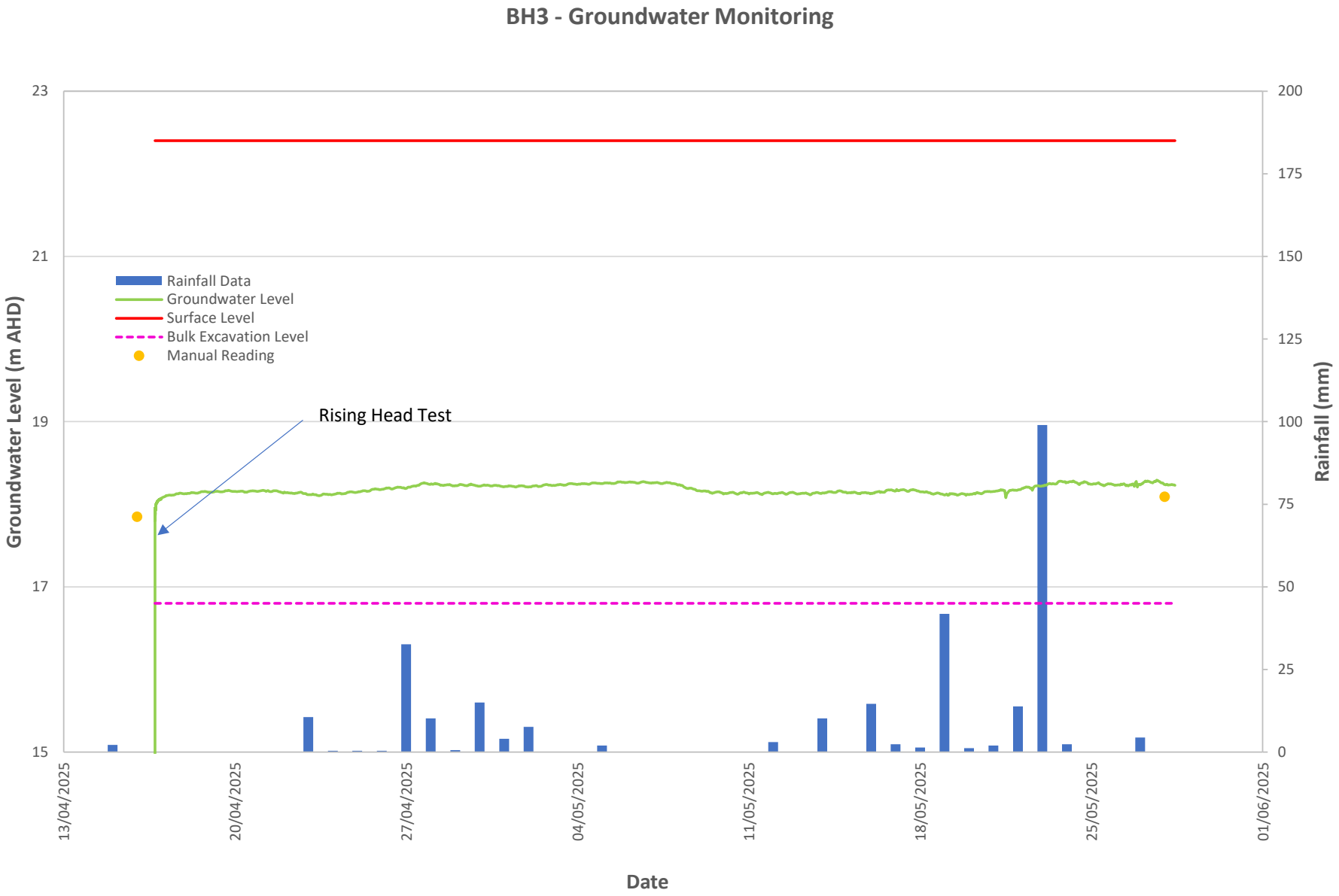
24/05/2024
07/06/2024
21/06/2024

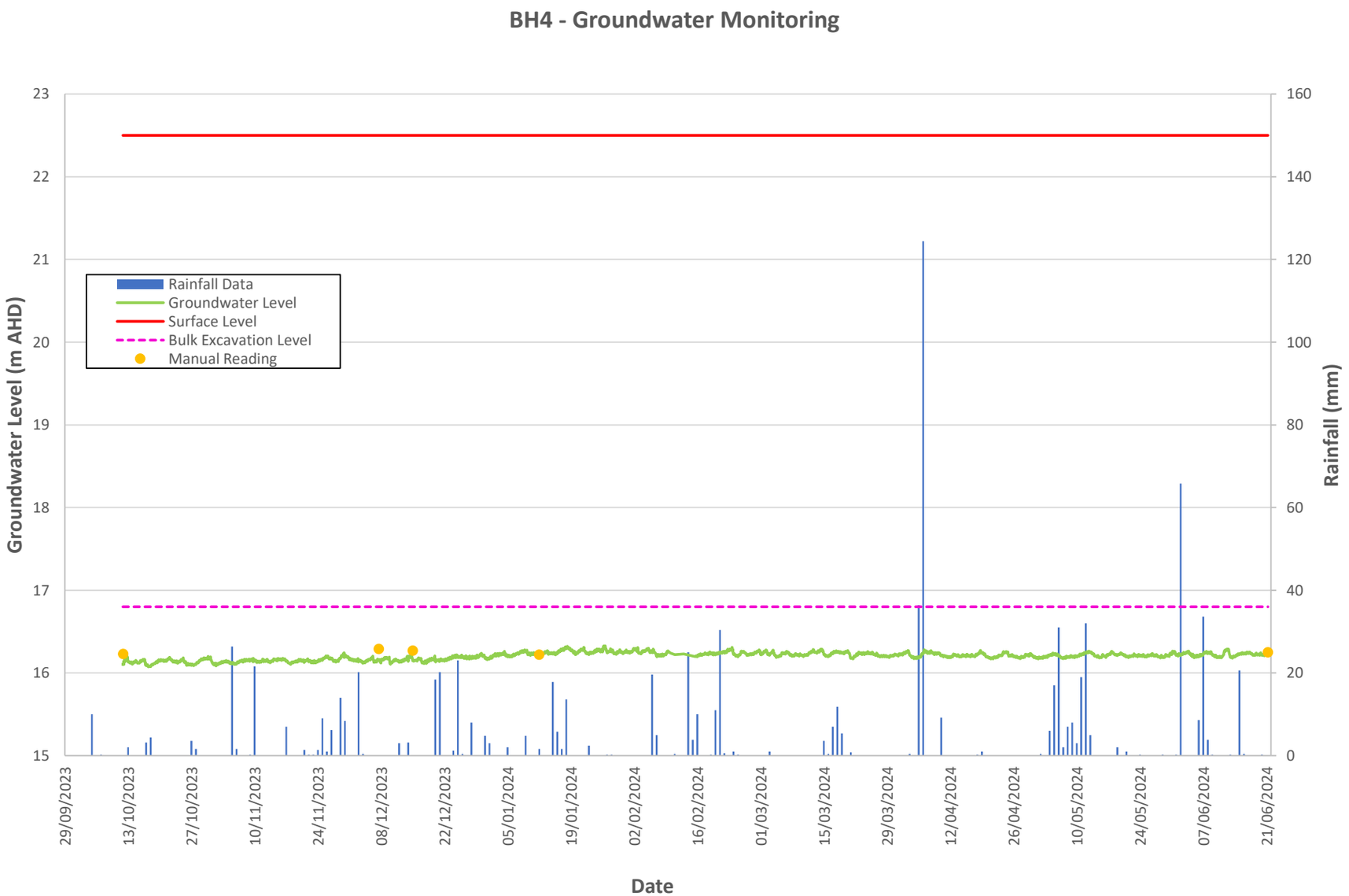

BH1 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
23
21
19
17
15
200
175
150
125
100
75
50
25
0
13/04/2025
20/04/2025
27/04/2025
04/05/2025
11/05/2025
18/05/2025
25/05/2025
01/06/2025


BH2 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
23
22
21
20
19
18
17
16
15
160
140
120
100
80
60
40
20
0
29/09/2023
13/10/2023
27/10/2023
10/11/2023
24/11/2023
08/12/2023
22/12/2023
05/01/2024
19/01/2024
02/02/2024
16/02/2024
01/03/2024
15/03/2024
29/03/2024
12/04/2024
26/04/2024
10/05/2024
24/05/2024
07/06/2024
21/06/2024


BH2 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
Rising Head Test
23
21
19
17
15
200
175
150
125
100
75
50
25
0
13/04/2025
20/04/2025
27/04/2025
04/05/2025
11/05/2025
18/05/2025
25/05/2025
01/06/2025


BH3 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
23
22
21
20
19
18
17
16
15
160
140
120
100
80
60
40
20
0
29/09/2023
13/10/2023
27/10/2023
10/11/2023
24/11/2023
08/12/2023
22/12/2023
05/01/2024
19/01/2024
02/02/2024
16/02/2024
01/03/2024
15/03/2024
29/03/2024
12/04/2024
26/04/2024
10/05/2024
24/05/2024
07/06/2024
21/06/2024


BH3 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
Rising Head Test
23
21
19
17
15
200
175
150
125
100
75
50
25
0
13/04/2025
20/04/2025
27/04/2025
04/05/2025
11/05/2025
18/05/2025
25/05/2025
01/06/2025


BH4 - Groundwater Monitoring
Groundwater Level (m AHD)
Rainfall (mm)
Date
Rainfall Data
Groundwater Level
Surface Level
Bulk Excavation Level
Manual Reading
23
22
21
20
19
18
17
16
15
160
140
120
100
80
60
40
20
0
29/09/2023
13/10/2023
27/10/2023
10/11/2023
24/11/2023
08/12/2023
22/12/2023
05/01/2024
19/01/2024
02/02/2024
16/02/2024
01/03/2024
15/03/2024
29/03/2024
12/04/2024
26/04/2024
10/05/2024
24/05/2024
07/06/2024
21/06/2024

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.02
Project:	Proposed Redevelopment of Compass Centre	Test date:	29-Sep-23
Location:	83-99 North Terrace, Bankstown	Tested by:	LL

Test Location

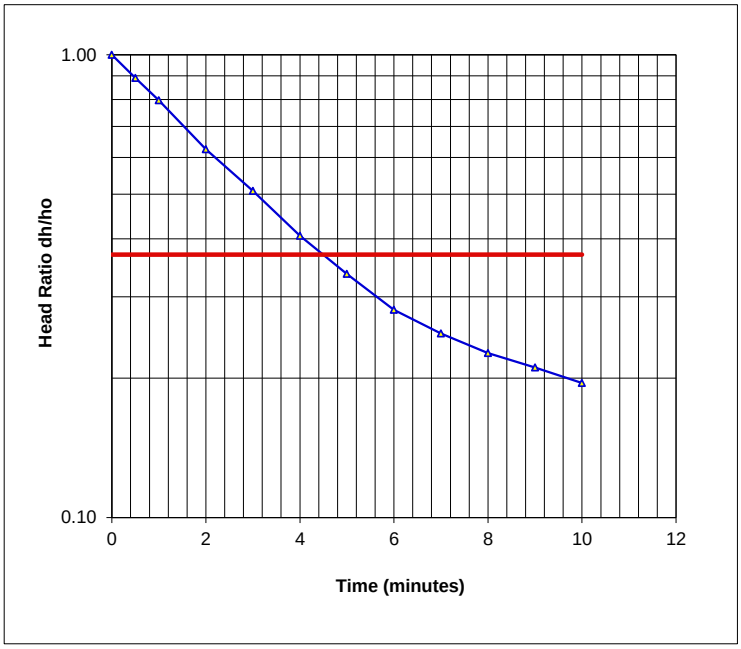
Description:	Standpipe in borehole	**Test No.**	BH1	
Material type:	Siltstone	Easting:	318338.9	m
		Northing	6245290.8	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.65	m
borehole diameter (2R)	76	mm	Depth to water at start of test	5.93	m
Effective Length of well screen (Le)	6.96	m	Depth of top of gravel pack	1.00	m
			Depth of base of gravel pack	11.61	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	5.93	1.28	1.000
0.5	5.79	1.14	0.891
1.0	5.67	1.02	0.797
2.0	5.45	0.80	0.625
3.0	5.30	0.65	0.508
4.0	5.17	0.52	0.406
5.0	5.08	0.43	0.336
6.0	5.01	0.36	0.281
7.0	4.97	0.32	0.250
8.0	4.94	0.29	0.227
9.0	4.92	0.27	0.211
10	4.90	0.25	0.195



To = 4.5 mins
270 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 = 2.0E-06** m/sec
= 1.7E-01 m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.02
Project:	Proposed Redevelopment of Compass Centre	Test date:	29-Sep-23
Location:	83-99 North Terrace, Bankstown	Tested by:	LL

Test Location

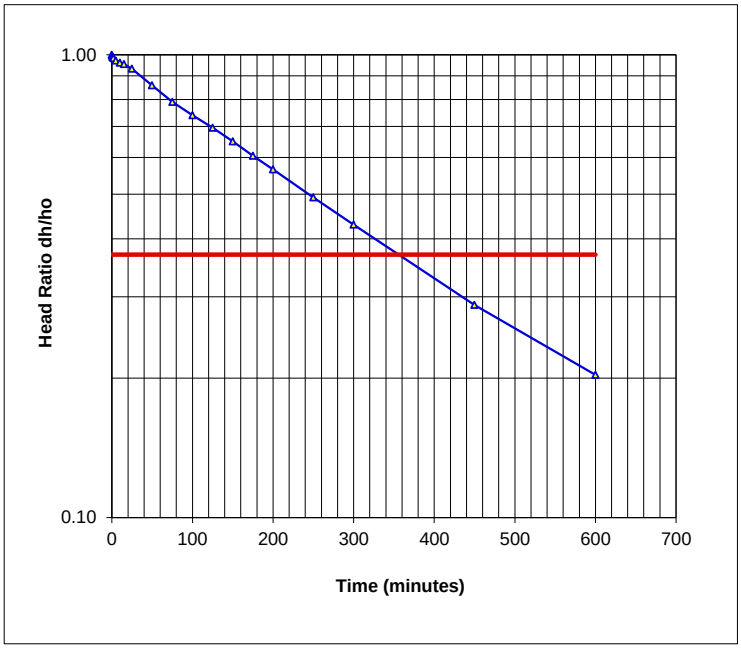
Description:	Standpipe in borehole	**Test No.**	BH2	
Material type:	Siltstone/Sandstone Interbedded	Easting:	318338.9	m
		Northing	6245290.8	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.65	m
borehole diameter (2R)	76	mm	Depth to water at start of test	6.42	m
Effective Length of well screen (Le)	7.45	m	Depth of top of gravel pack	1.20	m
			Depth of base of gravel pack	12.10	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	6.42	1.77	1.000
0.50	6.41	1.76	0.994
1	6.40	1.75	0.989
2	6.39	1.74	0.983
5	6.37	1.72	0.972
10	6.35	1.70	0.960
15	6.34	1.69	0.955
25	6.30	1.65	0.932
50	6.17	1.52	0.859
75	6.05	1.40	0.791
100	5.96	1.31	0.740
125	5.88	1.23	0.695
150	5.80	1.15	0.650
175	5.72	1.07	0.605
200	5.65	1.00	0.565
250	5.52	0.87	0.492
300	5.41	0.76	0.429
450	5.16	0.51	0.288
600	5.01	0.36	0.203



To = 360 mins
21600 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 = 2.4E-08** m/sec
= 2.0E-03 m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.02
Project:	Proposed Redevelopment of Compass Centre	Test date:	29-Sep-23
Location:	83-99 North Terrace, Bankstown	Tested by:	LL

Test Location

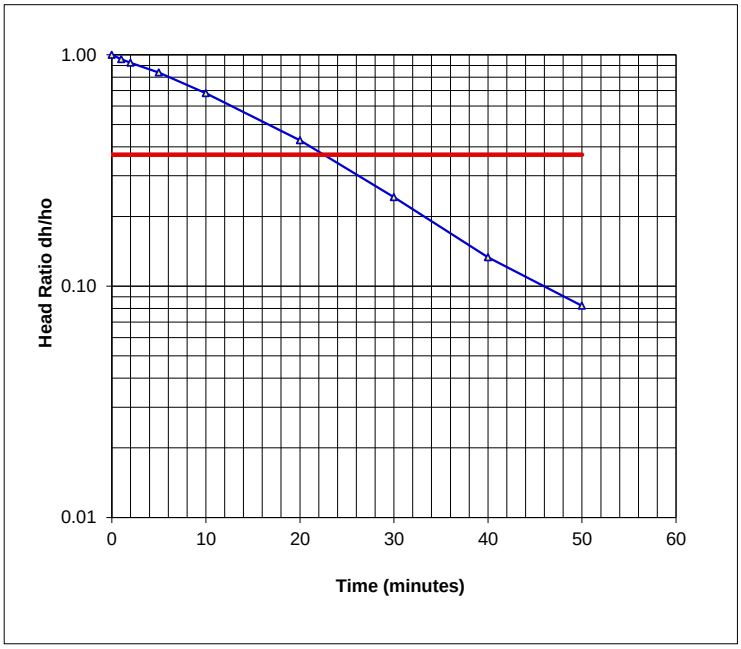
Description:	Standpipe in borehole	**Test No.**	BH3	
Material type:	Clay and Siltstone	Easting:	318362.8	m
		Northing	6245388.6	m
		Surface Level:	22.4	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.73	m
borehole diameter (2R)	76	mm	Depth to water at start of test	9.23	m
Effective Length of well screen (Le)	5.78	m	Depth of top of gravel pack	0.90	m
			Depth of base of gravel pack	10.51	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	9.23	4.50	1.000
1	9.03	4.30	0.956
2	8.89	4.16	0.924
5	8.50	3.77	0.838
10	7.80	3.07	0.682
20	6.65	1.92	0.427
30	5.82	1.09	0.242
40	5.33	0.60	0.133
50	5.10	0.37	0.082



To = 23.0 mins
1380 secs

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k = 4.5E-07** m/sec
= 3.9E-02 m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.02
Project:	Proposed Redevelopment of Compass Centre	Test date:	29-Sep-23
Location:	83-99 North Terrace, Bankstown	Tested by:	LL

Test Location

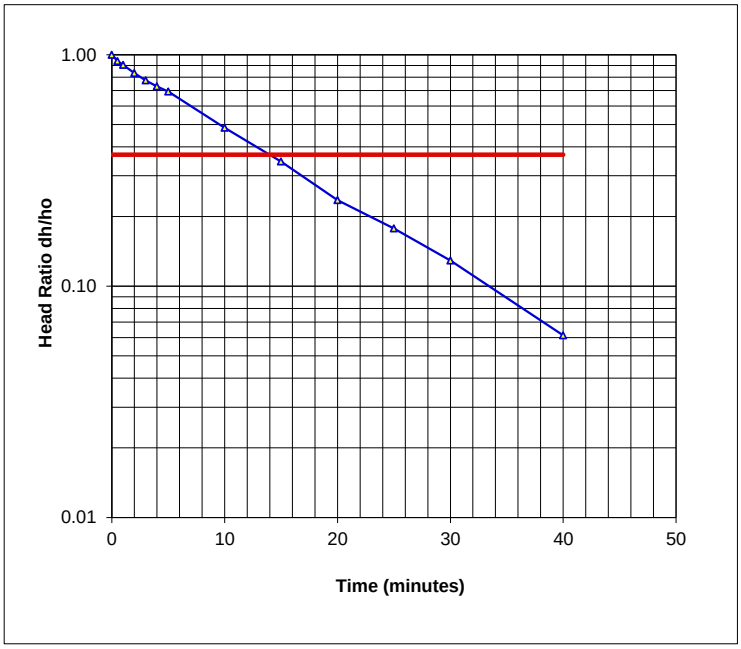
Description:	Standpipe in borehole	**Test No.**	BH4	
Material type:	Clay, Siltstone and Sandstone	Easting:	318390.3	m
		Northing	6245384.6	m
		Surface Level:	22.5	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	5.80	m
borehole diameter (2R)	76	mm	Depth to water at start of test	8.90	m
Effective Length of well screen (Le)	9.38	m	Depth of top of gravel pack	2.60	m
			Depth of base of gravel pack	15.18	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	8.9	3.10	1.000
0.5	8.71	2.91	0.939
1	8.60	2.80	0.903
2	8.38	2.58	0.832
3	8.20	2.40	0.774
4	8.06	2.26	0.729
5	7.95	2.15	0.694
10	7.30	1.50	0.484
15	6.87	1.07	0.345
20	6.53	0.73	0.235
25	6.35	0.55	0.177
30	6.20	0.40	0.129
40	5.99	0.19	0.061



To = 11.5 mins
690 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 = 6.1E-07** m/sec
= 5.3E-02 m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	16-Apr-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JM

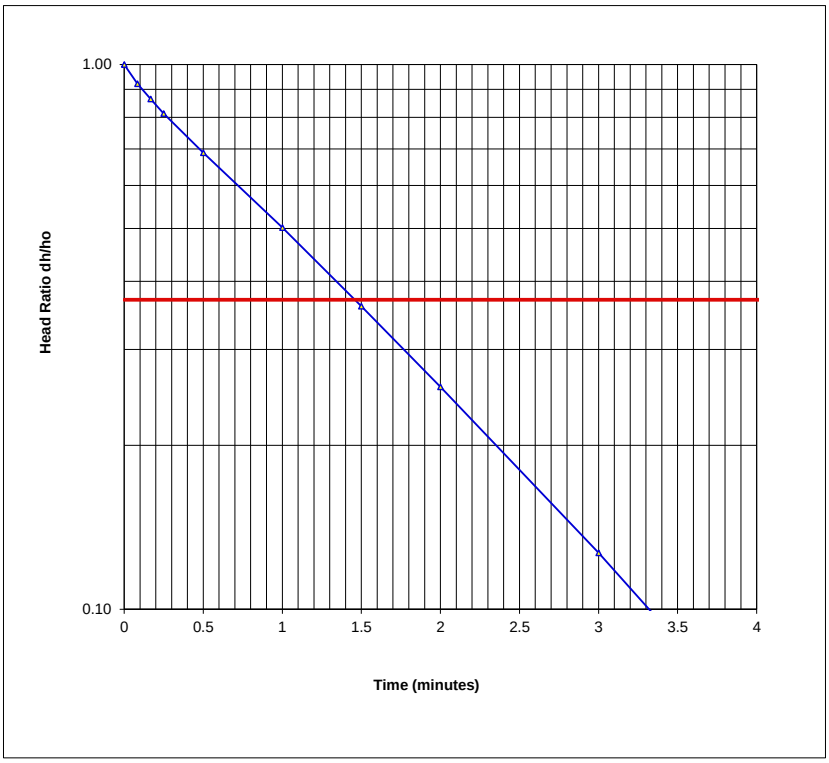
Test Location	BH1	**Test No.**	2	
Description:	Standpipe in borehole	Easting:	318299	m
Material type:	Siltstone	Northing	6245292	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.42	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	5.12	m
Effective well screen length (Le)	7.18	m	Depth of top of gravel pack	1.00	m
			Depth of base of PVC standpipe	11.60	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	5.12	0.70	1.000
0.08	5.07	0.65	0.922
0.17	5.03	0.61	0.865
0.25	4.99	0.57	0.813
0.50	4.91	0.49	0.689
1.00	4.77	0.35	0.502
1.50	4.67	0.25	0.360
2.00	4.60	0.18	0.256
3.00	4.51	0.09	0.127
4.00	4.46	0.04	0.060
5.00	4.44	0.02	0.030



To = 1.46 minutes
88 seconds

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 =**	**6.0E-06**	m/sec
	=	**0.5**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	16-Apr-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JM

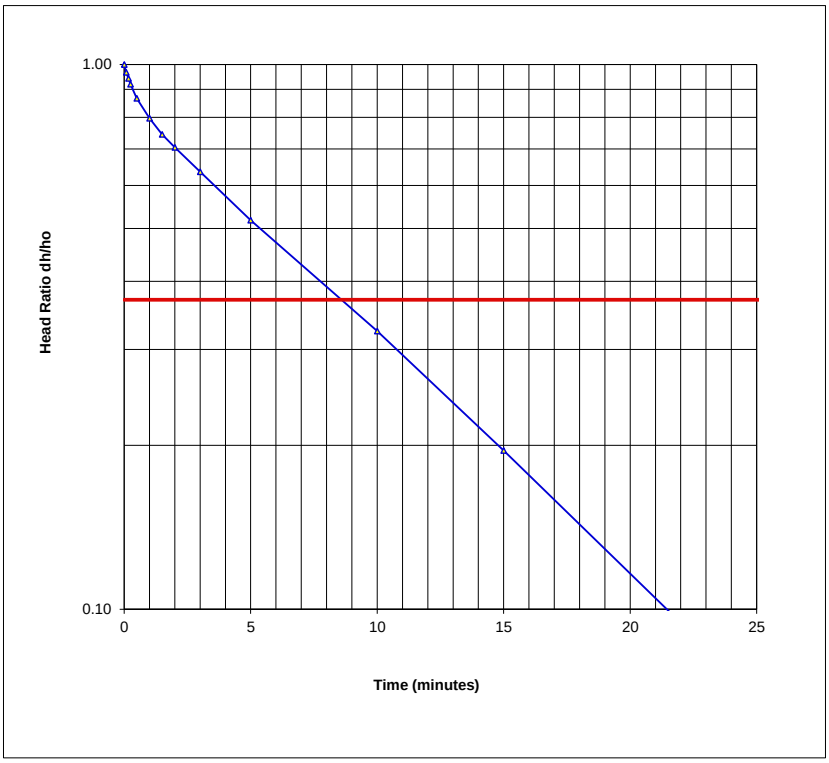
Test Location	BH1	**Test No.**	3	
Description:	Standpipe in borehole	Easting:	318299	m
Material type:	Siltstone	Northing	6245292	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.64	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	5.00	m
Effective well screen length (Le)	6.96	m	Depth of top of gravel pack	1.00	m
			Depth of base of PVC standpipe	11.60	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	5.00	0.36	1.000
0.08	4.99	0.35	0.968
0.17	4.98	0.34	0.943
0.25	4.98	0.34	0.920
0.50	4.96	0.32	0.867
1.00	4.93	0.29	0.797
1.50	4.91	0.27	0.744
2.00	4.90	0.26	0.704
3.00	4.87	0.23	0.636
5.00	4.83	0.19	0.518
10.0	4.76	0.12	0.324
15.0	4.71	0.07	0.196
30.0	4.66	0.02	0.041



To = 8.6 minutes
516 seconds

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 =**	**1.0E-06**	m/sec
	=	**0.1**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	28-May-25
Location:	83-99 North Terrace, Bankstown	Tested by:	SA

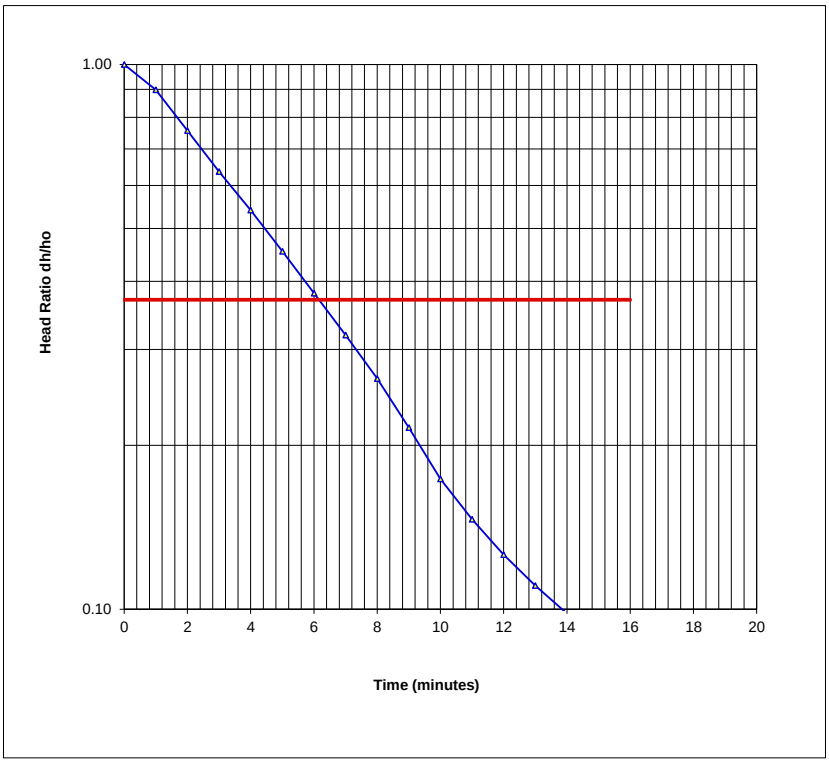
Test Location	BH2	**Test No.**	2	
Description:	Standpipe in borehole	Easting:	318339	m
Material type:	Siltstone	Northing	6245291	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.15	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	7.65	m
Effective well screen length (Le)	7.95	m	Depth of top of gravel pack	1.20	m
			Depth of base of PVC standpipe	12.10	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	7.64	3.49	1.000
1	7.30	3.15	0.899
2	6.80	2.65	0.756
3	6.38	2.23	0.636
4	6.04	1.89	0.541
5	5.74	1.59	0.454
6	5.48	1.33	0.380
7	5.27	1.12	0.319
8	5.08	0.93	0.265
9	4.90	0.75	0.216
10	4.76	0.61	0.174
11	4.66	0.51	0.146
12	4.59	0.44	0.126
13	4.54	0.39	0.111
14	4.49	0.34	0.098
15	4.46	0.31	0.089
16	4.43	0.28	0.081



To = 6 minutes
360 seconds

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 =**	**1.3E-06**	m/sec
	=	**0.1**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	16-Apr-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JM

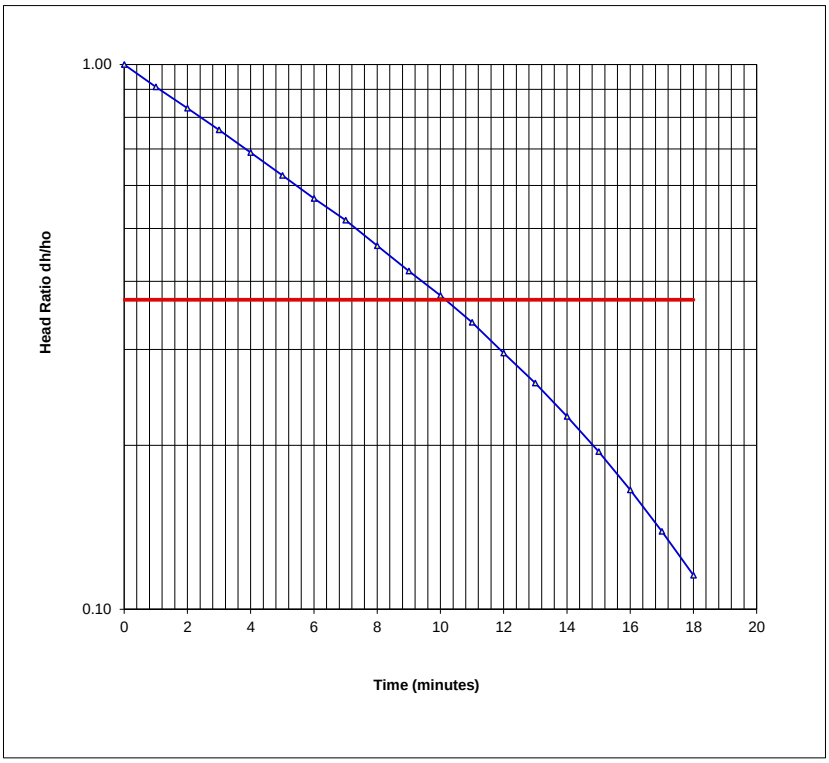
Test Location	BH2	**Test No.**	3	
Description:	Standpipe in borehole	Easting:	318339	m
Material type:	Siltstone	Northing	6245291	m
		Surface Level:	22.3	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.42	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	7.55	m
Effective well screen length (Le)	7.68	m	Depth of top of gravel pack	1.20	m
			Depth of base of PVC standpipe	12.10	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	7.55	3.13	1.000
1	7.27	2.85	0.910
2	7.02	2.60	0.831
3	6.79	2.37	0.758
4	6.58	2.16	0.689
5	6.38	1.96	0.626
6	6.20	1.78	0.568
7	6.04	1.62	0.518
8	5.87	1.45	0.465
9	5.73	1.31	0.418
10	5.60	1.18	0.377
11	5.47	1.05	0.336
12	5.34	0.92	0.295
13	5.23	0.81	0.260
14	5.13	0.71	0.226
15	5.03	0.61	0.195
16	4.94	0.52	0.166
17	4.86	0.44	0.139
18	4.78	0.36	0.115



To = 10 minutes
600 seconds

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 =**	**8.3E-07**	m/sec
	=	**0.1**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	3-Jun-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JDB

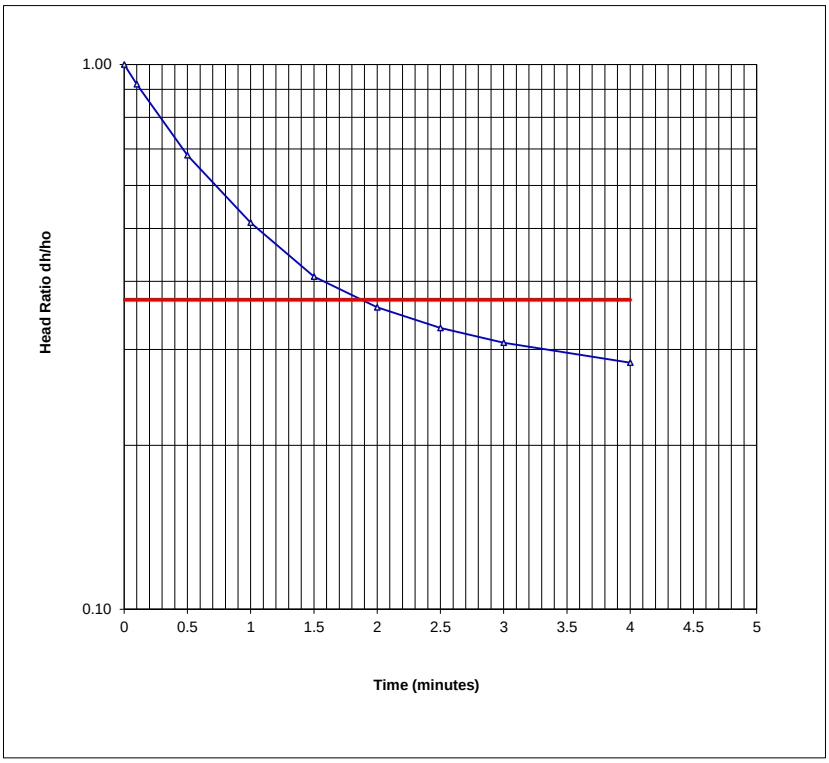
Test Location	BH3	**Test No.**	2	
Description:	Standpipe in borehole	Easting:	318363	m
Material type:	Siltstone	Northing	6245389	m
		Surface Level:	22.4	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.48	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	6.49	m
Effective well screen length (Le)	6.02	m	Depth of top of gravel pack	1.00	m
			Depth of base of PVC standpipe	10.50	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	6.49	2.01	1.000
0.10	6.33	1.85	0.920
0.50	5.85	1.37	0.682
1.00	5.51	1.03	0.512
1.50	5.30	0.82	0.408
2.00	5.20	0.72	0.358
2.50	5.14	0.66	0.328
3.00	5.10	0.62	0.308
4.00	5.05	0.57	0.284



To = 1.75 minutes
105 seconds

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 =**	**5.8E-06**	m/sec
	=	**0.5**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	28-May-25
Location:	83-99 North Terrace, Bankstown	Tested by:	SA

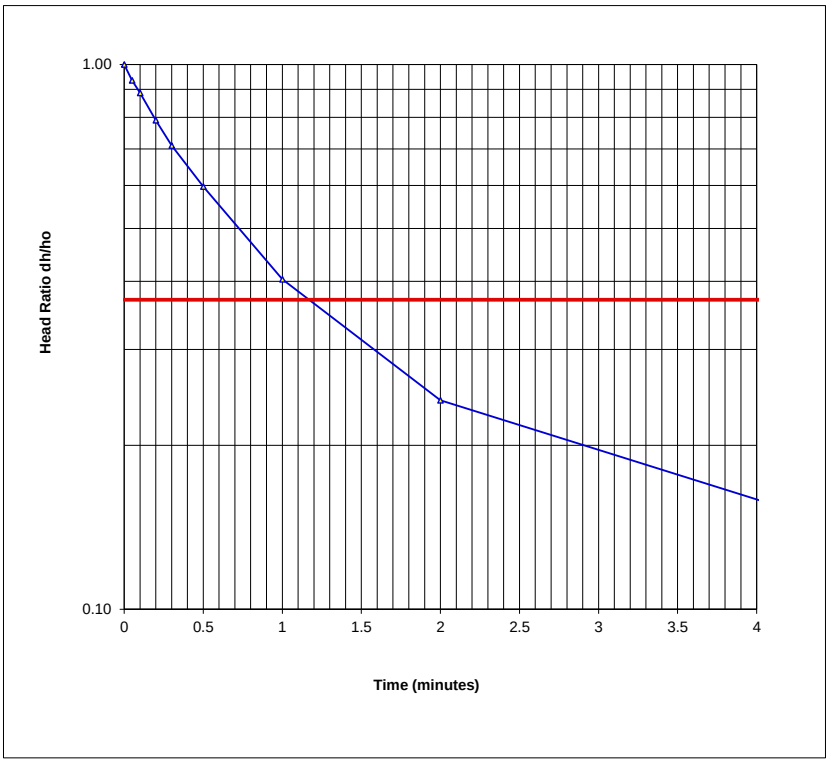
Test Location	BH3	**Test No.**	3	
Description:	Standpipe in borehole	Easting:	318363	m
Material type:	Siltstone	Northing	6245389	m
		Surface Level:	22.4	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.9	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	5.52	m
Effective well screen length (Le)	5.60	m	Depth of top of gravel pack	1.00	m
			Depth of base of PVC standpipe	10.50	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	5.52	0.62	1.000
0.05	5.48	0.58	0.935
0.10	5.45	0.55	0.887
0.20	5.39	0.49	0.790
0.30	5.34	0.44	0.710
0.50	5.27	0.37	0.597
1.00	5.15	0.25	0.403
2.00	5.05	0.15	0.242
5.00	4.98	0.08	0.129



To = 1.2 minutes
72 seconds

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 =**	**8.9E-06**	m/sec
	=	**0.8**	m/day

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Permeability Testing - Rising Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	3-Jun-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JDB

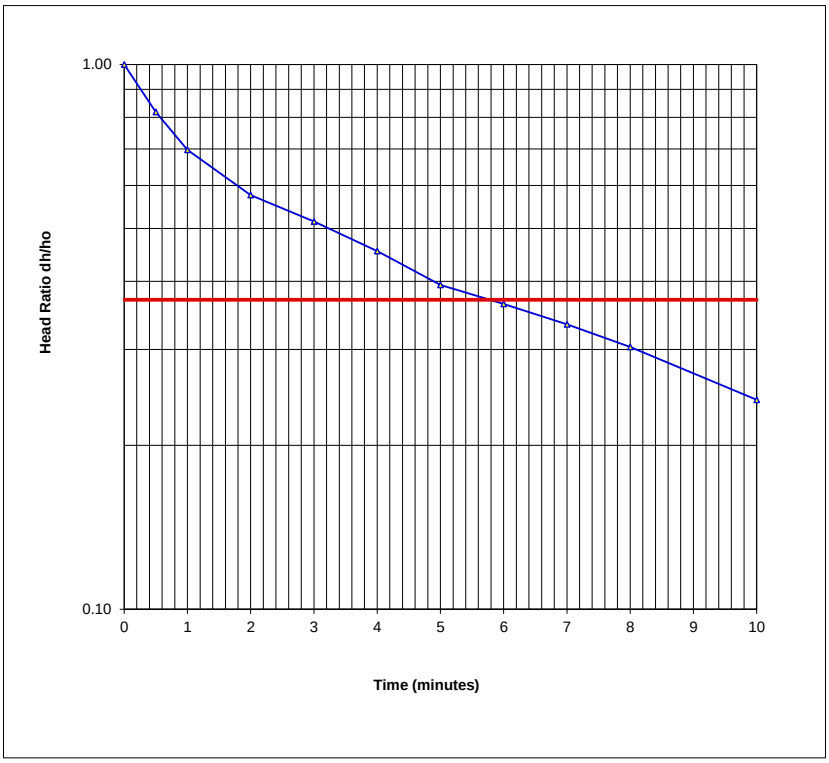
Test Location	BH4	**Test No.**	2	
Description:	Standpipe in borehole	Easting:	318390	m
Material type:	Siltstone	Northing	6245385	m
		Surface Level:	22.5	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	6.18	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	6.51	m
Effective well screen length (Le)	9.00	m	Depth of top of gravel pack	2.60	m
			Depth of base of PVC standpipe	15.18	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	6.51	0.33	1.000
0.50	6.45	0.27	0.818
1.00	6.41	0.23	0.697
2.00	6.37	0.19	0.576
3.00	6.35	0.17	0.515
4.00	6.33	0.15	0.455
5.00	6.31	0.13	0.394
6.00	6.30	0.12	0.364
7.00	6.29	0.11	0.333
8.00	6.28	0.10	0.303
10.0	6.26	0.08	0.242



To = 6.5 minutes
390 seconds

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 =**	**1.1E-06**	m/sec
	=	**0.1**	m/day

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Permeability Testing - Falling Head Test Report

Client:	Essence Project Management Pty Ltd	Project No:	213805.05
Project:	Altis Compass Centre Redevelopment	Test date:	3-Jun-25
Location:	83-99 North Terrace, Bankstown	Tested by:	JDB

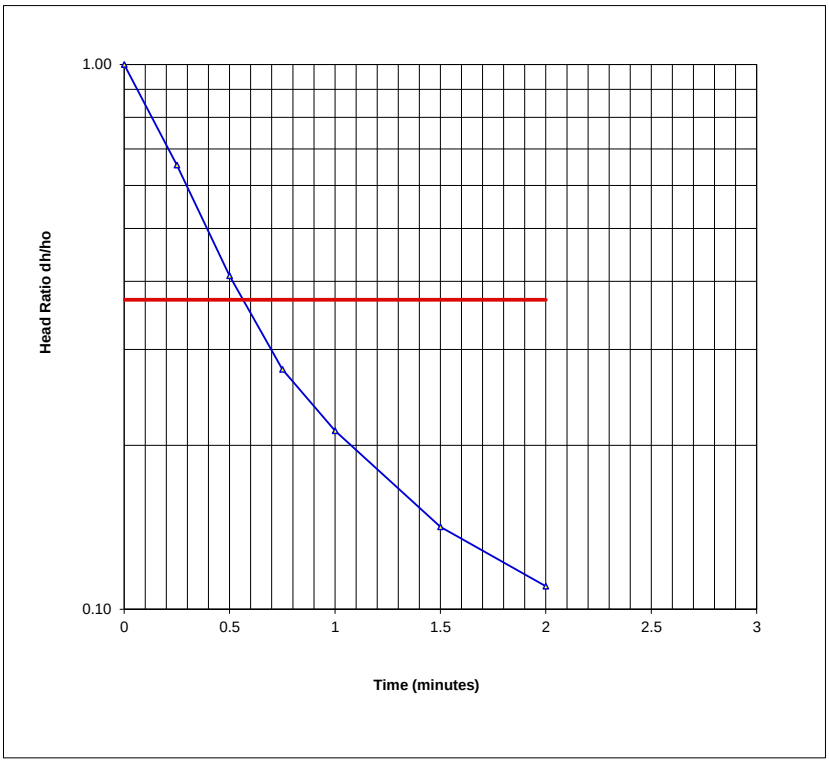
Test Location	BH4	**Test No.**	3	
Description:	Standpipe in borehole	Easting:	318390	m
Material type:	Siltstone	Northing	6245385	m
		Surface Level:	22.5	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	6.18	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	4.91	m
Effective well screen length (Le)	9.00	m	Depth of top of gravel pack	2.60	m
			Depth of base of PVC standpipe	15.18	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.00	4.91	1.27	1.000
0.25	5.35	0.83	0.654
0.50	5.66	0.52	0.409
0.75	5.83	0.35	0.276
1.00	5.91	0.27	0.213
1.50	6.00	0.18	0.142
2.00	6.04	0.14	0.110



To = 0.6 minutes
36 seconds

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 =**	**1.2E-05**	m/sec
	=	**1.1**	m/day

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

The soil group symbol classifications are given as follows based on two major soil divisions:

- Coarse-grained soils
- Fine-grained soils

Major Divisions				Description	
				Group Symbol*	Typical Name
COARSE-GRAINED SOILS	More than 65% by dry mass, (excluding that larger than 63 mm) is greater than 0.075 mm	GRAVEL	More than 50% of coarse grains are greater than 2.36 mm	GW	Well graded gravels and gravel-sand mixtures, little or no fines.
				GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
		GRAVELLY SOILS		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clay gravels, gravel-sand-clay mixtures.
		SAND	More than 50% of coarse grains are less than 2.36 mm	SW	Well graded sands and gravelly sands, little or no fines.
				SP	Poorly graded sands and gravelly sands, little or no fines.
		SANDY SOILS		SM	Silty sand, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.

* For coarse grained soils where the fines content is between 5% and 12%, the soil shall be given a dual classification eg GP-GM.

FINE-GRAINED SOILS	More than 35% by dry mass, (excluding that larger than 63 mm) is less than 0.075 mm	Liquid Limit less than 35%	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity
		35% <LL< 50%	CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Liquid Limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
			Pt	Peat muck and other highly organic soils.

Soil Descriptions

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

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

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay, trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand, trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand, trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

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

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	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.
Extremely weathered	XW	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
Highly weathered	HW	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.
Moderately weathered	MW	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.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	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.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

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

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

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

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

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

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

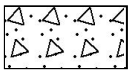
Symbols & Abbreviations

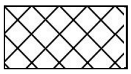
Graphic Symbols for Soil and Rock

General

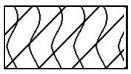

Asphalt

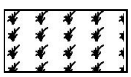

Road base

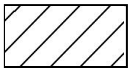

Concrete

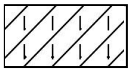

Filling

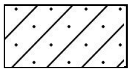
Soils


Topsoil

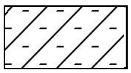

Peat


Clay


Silty clay


Sandy clay


Gravelly clay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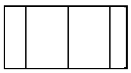
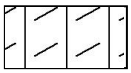
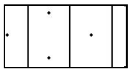
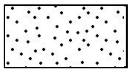
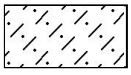
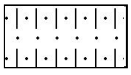

Silt


Clayey silt


Sandy silt

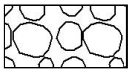

Sand

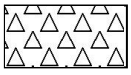

Clayey sand


Silty sand


Gravel

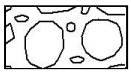

Sandy gravel


Cobbles, boulders

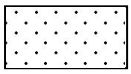

Talus

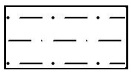
Sedimentary Rocks

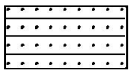

Boulder conglomerate

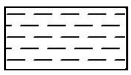

Conglomerate


Conglomeratic sandstone

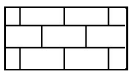

Sandstone


Siltstone

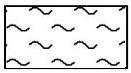

Laminite

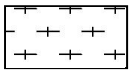

Mudstone, claystone, shale

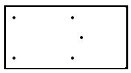

Coal


Limestone

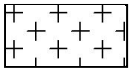
Metamorphic Rocks

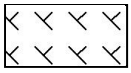

Slate, phyllite, schist

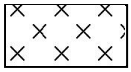

Gneiss

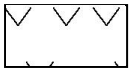

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Cone Penetration Tests

Douglas Partners

Introduction

The Cone Penetration Test (CPT) is a sophisticated soil profiling test carried out in-situ. A special cone shaped probe is used which is connected to a digital data acquisition system. The cone and adjoining sleeve section contain a series of strain gauges and other transducers which continuously monitor and record various soil parameters as the cone penetrates the soils.

The soil parameters measured depend on the type of cone being used, however they always include the following basic measurements

- Cone tip resistance q_c
- Sleeve friction f_s
- Inclination (from vertical) i
- Depth below ground z

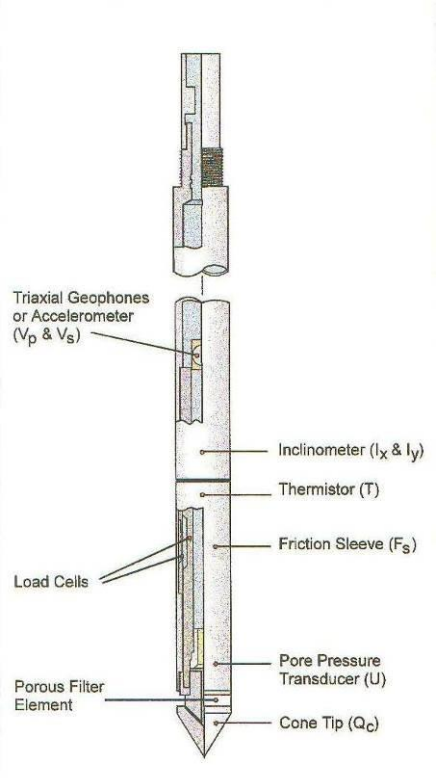


Figure 1: Cone Diagram

The inclinometer in the cone enables the verticality of the test to be confirmed and, if required, the vertical depth can be corrected.

The cone is thrust into the ground at a steady rate of about 20 mm/sec, usually using the hydraulic rams of a purpose built CPT rig, or a drilling rig. The testing is carried out in accordance with the Australian Standard AS1289 Test 6.5.1.

Figure 2: Purpose built CPT rig

The CPT can penetrate most soil types and is particularly suited to alluvial soils, being able to detect fine layering and strength variations. With sufficient thrust the cone can often penetrate a short distance into weathered rock. The cone will usually reach refusal in coarse filling, medium to coarse gravel and on very low strength or better rock. Tests have been successfully completed to more than 60 m.

Types of CPTs

Douglas Partners (and its subsidiary GroundTest) owns and operates the following types of CPT cones:

Type	Measures
Standard	Basic parameters (q_c, f_s, i & z)
Piezocone	Dynamic pore pressure (u) plus basic parameters. Dissipation tests estimate consolidation parameters
Conductivity	Bulk soil electrical conductivity (σ) plus basic parameters
Seismic	Shear wave velocity (V_s), compression wave velocity (V_p), plus basic parameters

Strata Interpretation

The CPT parameters can be used to infer the Soil Behaviour Type (SBT), based on normalised values of cone resistance (Qt) and friction ratio (Fr). These are used in conjunction with soil classification charts, such as the one below (after Robertson 1990)

Cone Penetration Tests

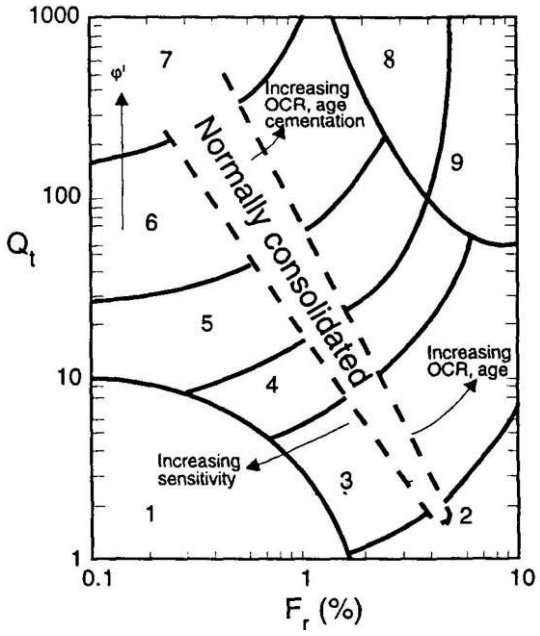


Figure 3: Soil Classification Chart

DP's in-house CPT software provides computer aided interpretation of soil strata, generating soil descriptions and strengths for each layer. The software can also produce plots of estimated soil parameters, including modulus, friction angle, relative density, shear strength and over consolidation ratio.

DP's CPT software helps our engineers quickly evaluate the critical soil layers and then focus on developing practical solutions for the client's project.

Engineering Applications

There are many uses for CPT data. The main applications are briefly introduced below:

Settlement

CPT provides a continuous profile of soil type and strength, providing an excellent basis for settlement analysis. Soil compressibility can be estimated from cone derived moduli, or known consolidation parameters for the critical layers (eg. from laboratory testing). Further, if pore pressure dissipation tests are undertaken using a piezocone, in-situ consolidation coefficients can be estimated to aid analysis.

Pile Capacity

The cone is, in effect, a small scale pile and, therefore, ideal for direct estimation of pile capacity. DP's in-house program ConePile can analyse most pile types and produces pile capacity versus depth plots. The analysis methods are based on proven static theory and empirical studies, taking account of scale effects, pile materials and method of installation. The results are expressed in limit state format, consistent with the Piling Code AS2159.

Dynamic or Earthquake Analysis

CPT and, in particular, Seismic CPT are suitable for dynamic foundation studies and earthquake response analyses, by profiling the low strain shear modulus G_0. Techniques have also been developed relating CPT results to the risk of soil liquefaction.

Other Applications

Other applications of CPT include ground improvement monitoring (testing before and after works), salinity and contaminant plume mapping (conductivity cone), preloading studies and verification of strength gain.

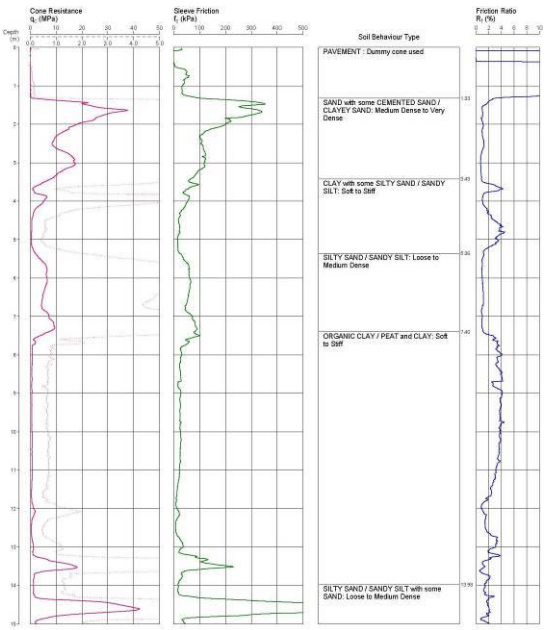


Figure 4: Sample Cone Plot

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

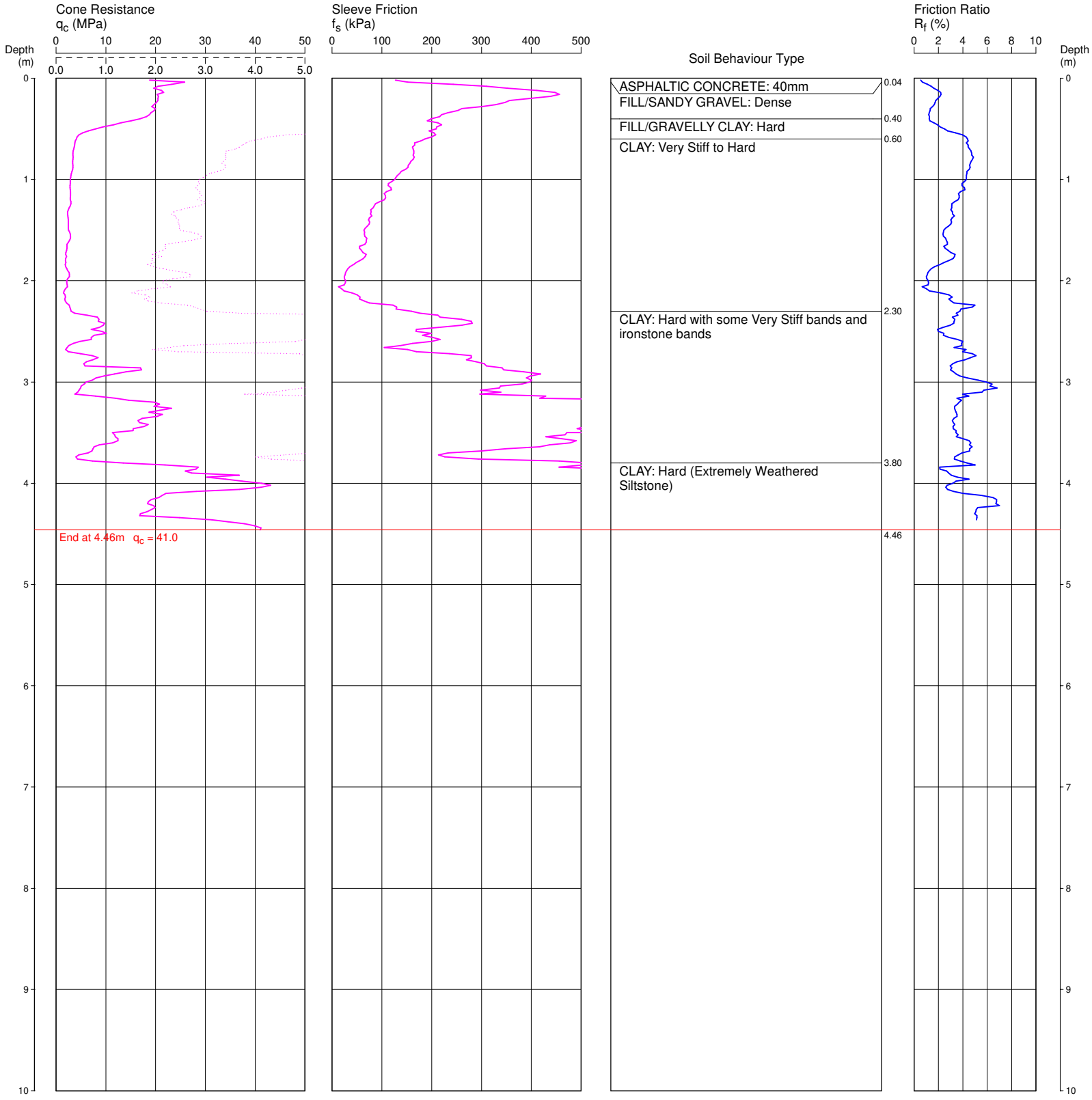
REDUCED LEVEL: 22.4

COORDINATES: 318362.8E 6245388.6N

CPT3

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
HOLE COLLAPSED AT 1.7M AFTER WITHDRAWAL OF RODS.

File: \\dpsydnas02\Projects\213805.02 - BANKSTOWN, Bankstown Compass Centre, GI\4.0 Field Work\4.2 Testing\CPT3.CP5
Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

REDUCED LEVEL: 22.5

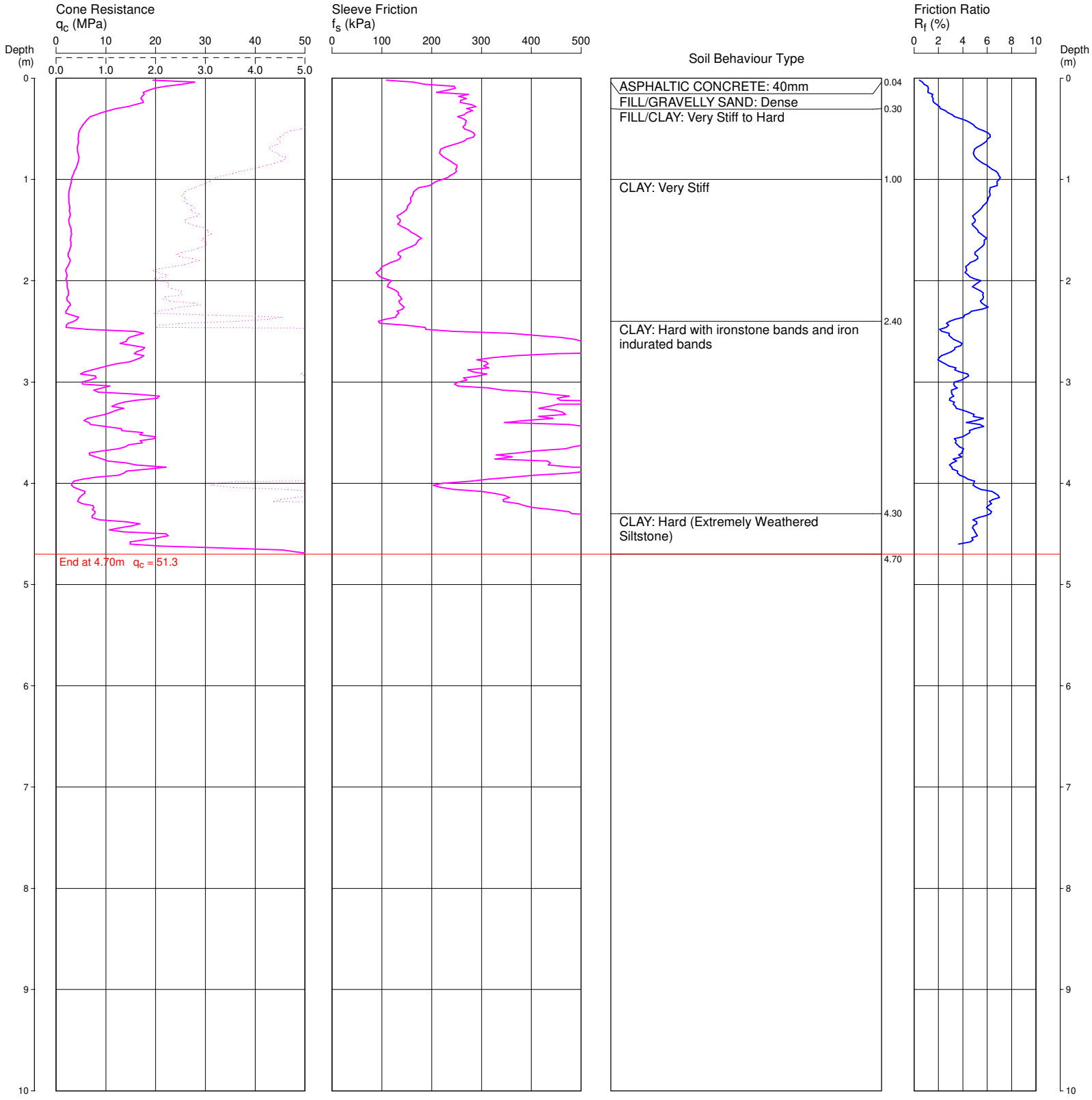
COORDINATES: 318390.3E 6245384.6N

CPT4

Page 1 of 1

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
NO GROUNDWATER OBSERVED AFTER WITHDRAWAL OF RODS.

File: \\dpsydnas02\Projects\213805.02 - BANKSTOWN, Bankstown Compass Centre, GI\4.0 Field Work\4.2 Testing\CPT4.CP5
Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

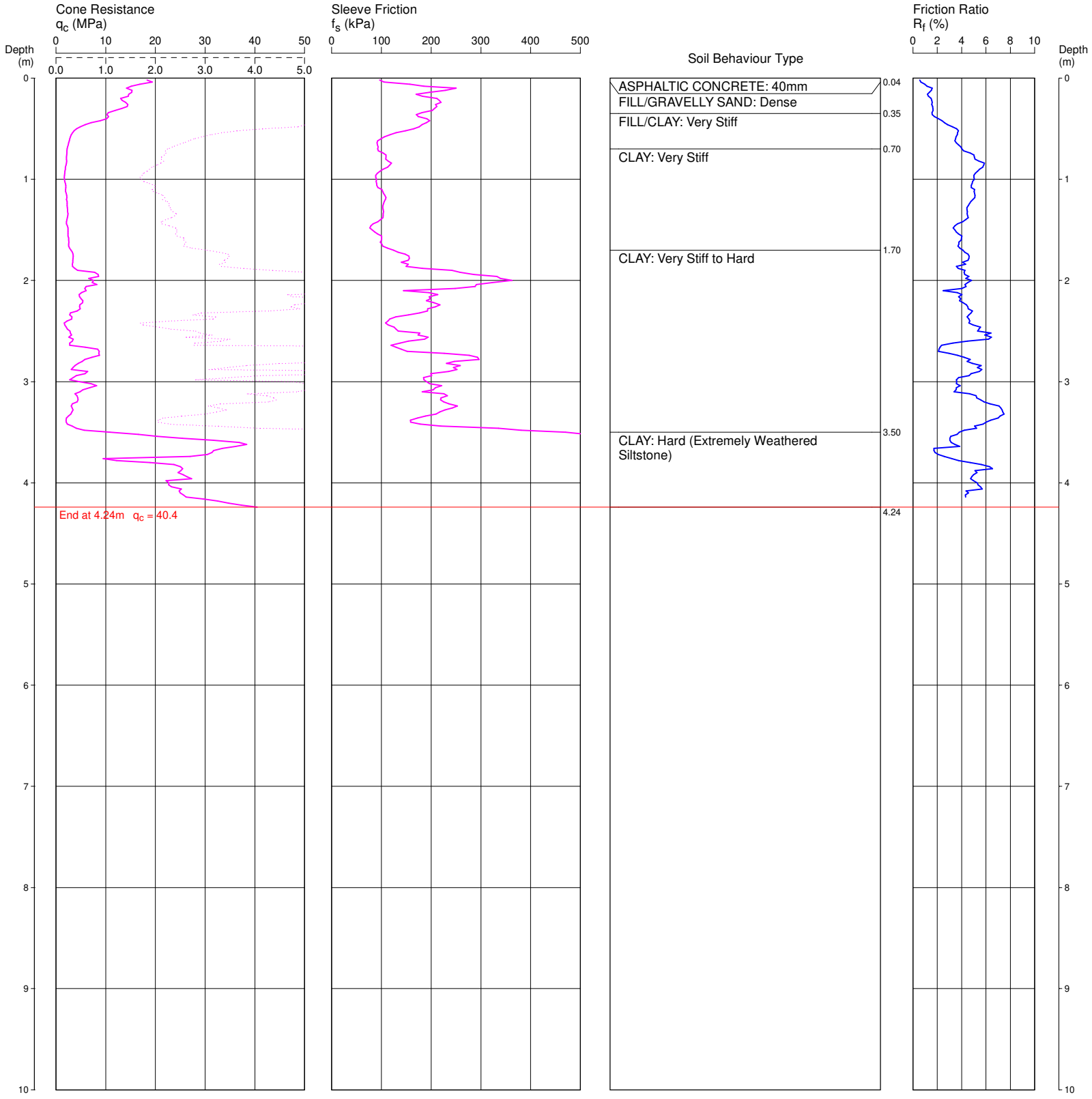
REDUCED LEVEL: 22.5

COORDINATES: 318363.3E 6245364.2N

CPT5

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
NO GROUNDWATER OBSERVED AFTER WITHDRAWAL OF RODS.

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Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

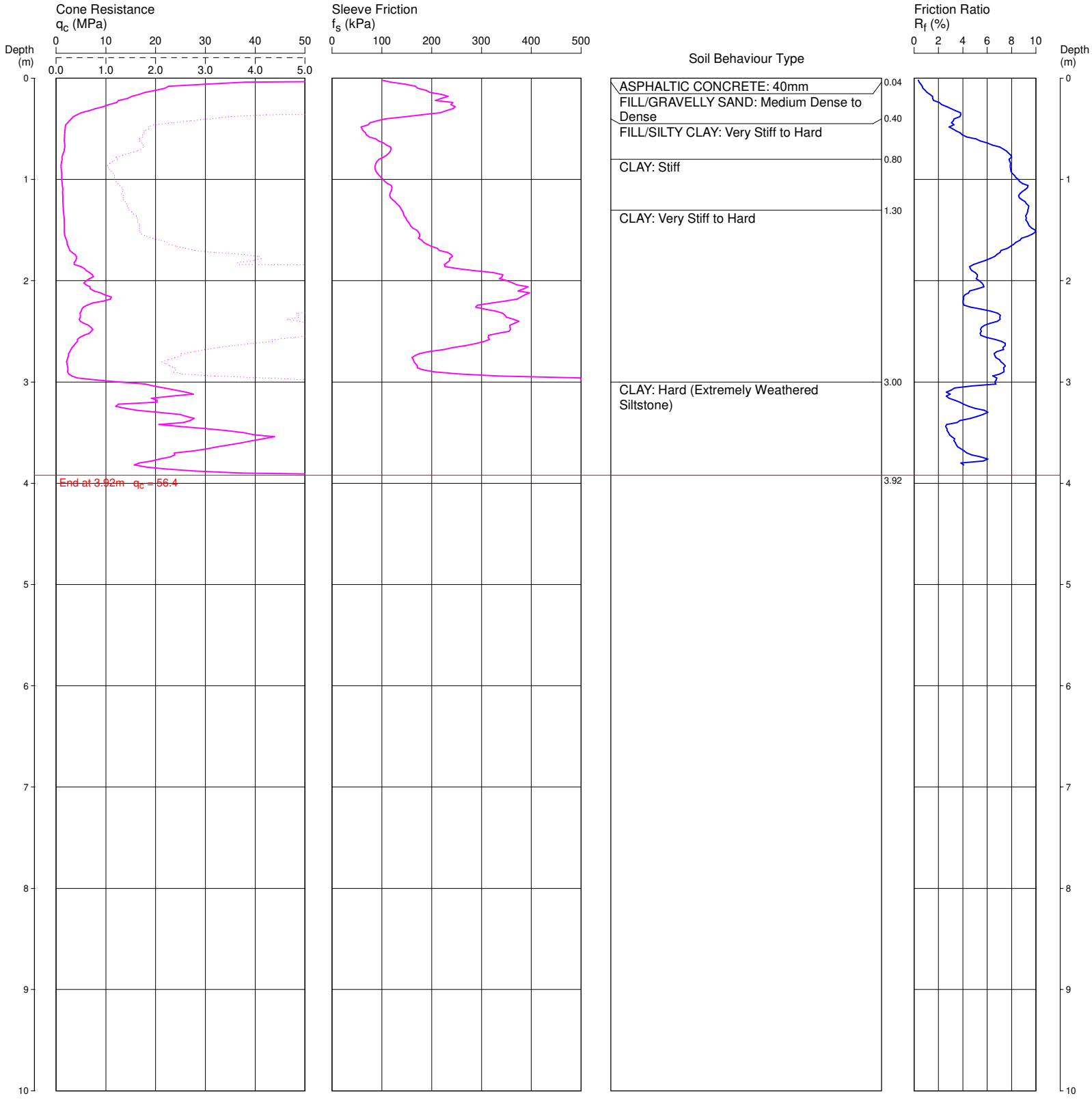
REDUCED LEVEL: 22.7

COORDINATES: 318313.8E 6245358.4N

CPT6

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
HOLE COLLAPSED AT 0.5M AFTER WITHDRAWAL OF RODS.

File: \\dpsydnas02\Projects\213805.02 - BANKSTOWN, Bankstown Compass Centre, GI\4.0 Field Work\4.2 Testing\CPT6.CP5
Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

REDUCED LEVEL: 22.0

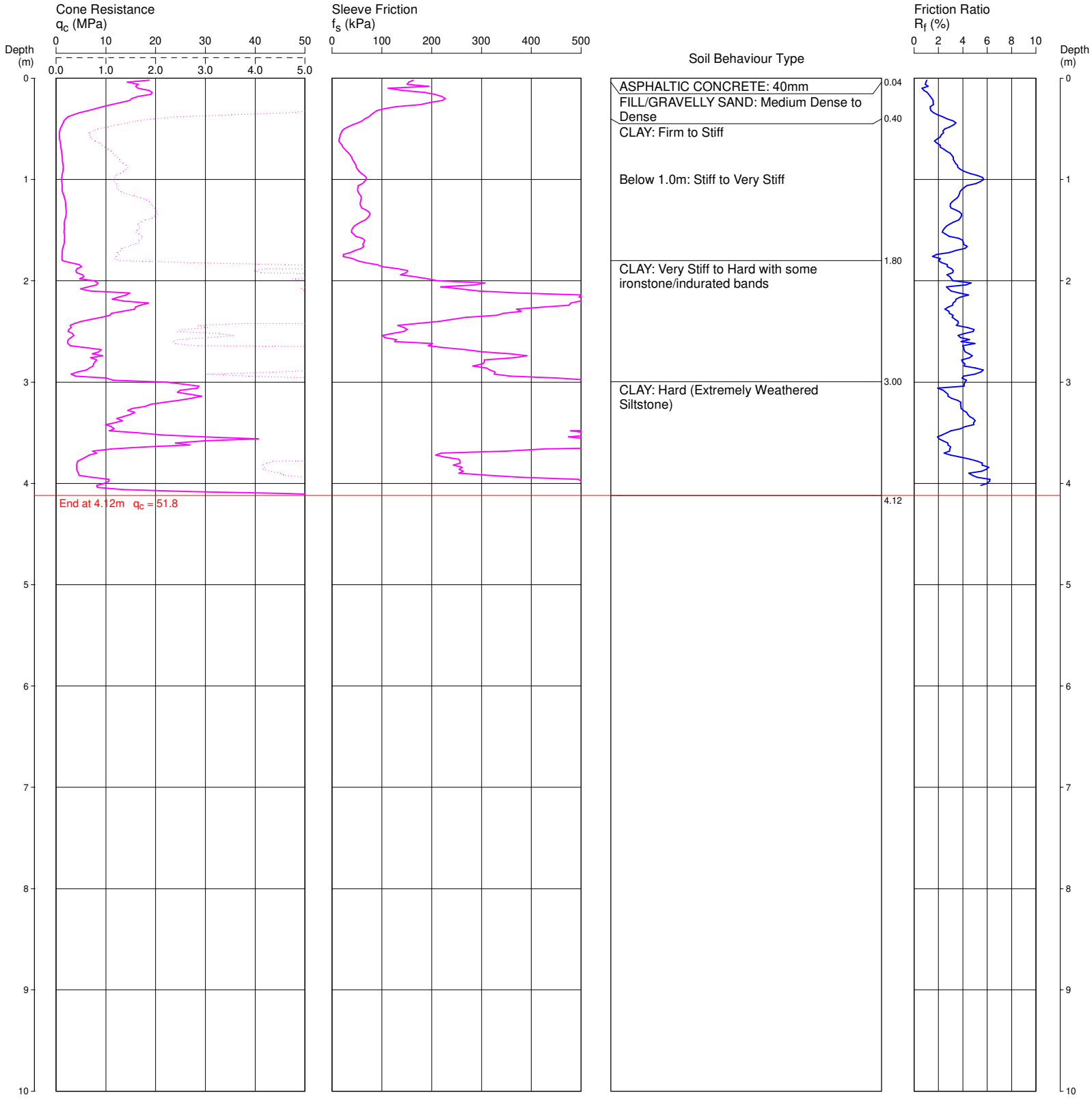
COORDINATES: 318354.6E 6245377.0N

CPT7

Page 1 of 1

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
HOLE COLLAPSED AT 0.5M AFTER WITHDRAWAL OF RODS.

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Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: ESSENCE PROJECT MANAGEMENT PTY LTD

PROJECT: PROPOSED REDEVELOPMENT OF ALTIS COMPASS CENTRE

LOCATION: 83-99 NORTH TERRACE, BANKSTOWN

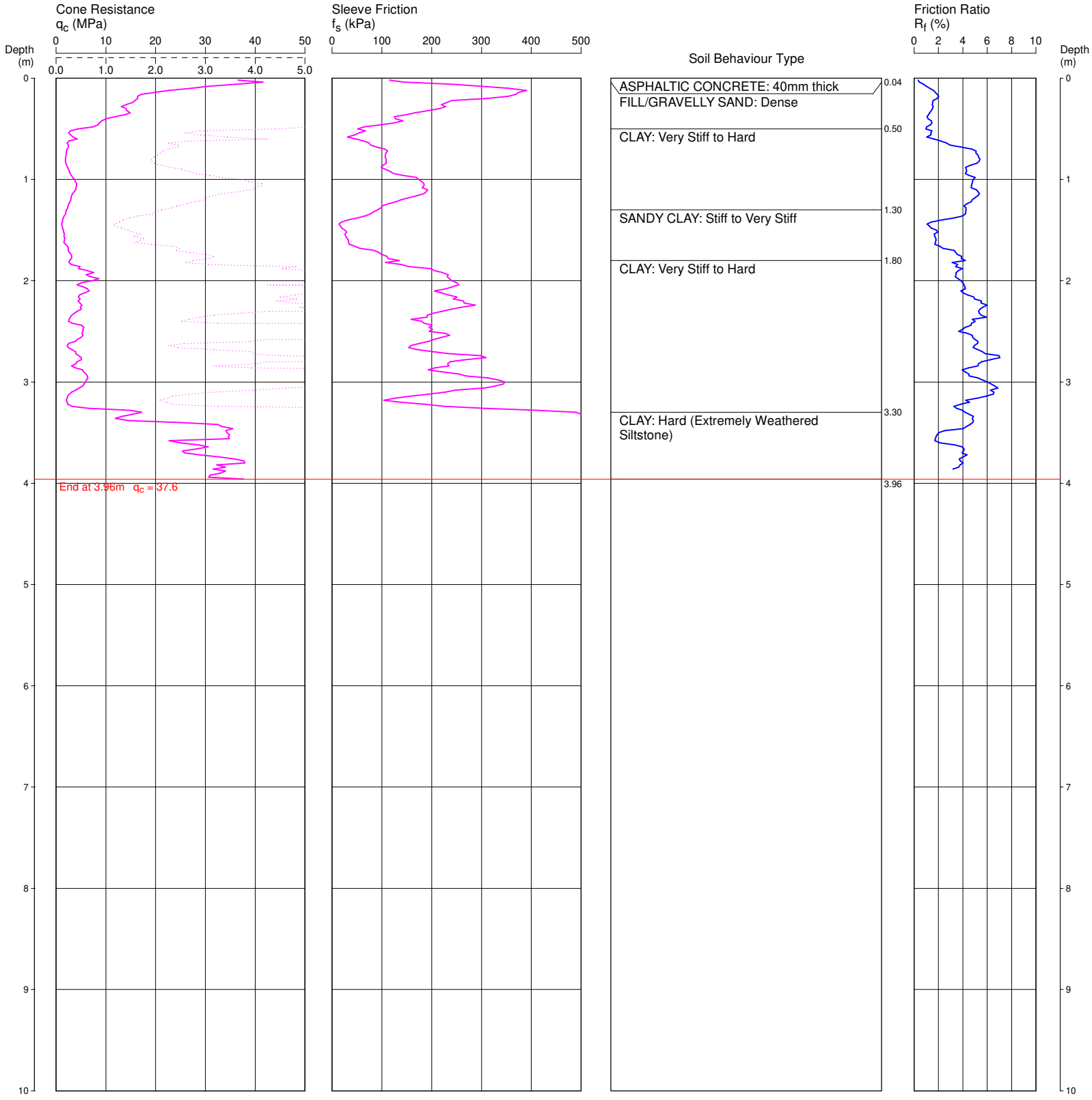
REDUCED LEVEL: 22.0

COORDINATES: 318337.3E 6245355.3N

CPT8

DATE 11/07/2023

PROJECT No: 213805.02



REMARKS: TEST DISCONTINUED DUE TO REFUSAL ON INFERRED WEATHERED ROCK.
HOLE COLLAPSED AT 1.2M AFTER WITHDRAWAL OF RODS.

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Cone ID: 220607 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.3 AHD
EASTING: 318298.5
NORTHING: 6245292
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 213805.02
DATE: 18 - 20/7/2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
22	0.16	CONCRETE SLAB: 160mm thick										
	0.3	FILL/GRAVEL: fine to coarse, igneous, dark grey, with fine sand							A			
	0.6	FILL/GRAVELLY CLAY: low plasticity, brown, fine to medium igneous gravel, w~PL							A			
1	1.0	Silty CLAY CI-CH: medium to high plasticity, grey-brown, w~PL, apparently stiff, residual							A			
21	1.16	SILTSTONE: grey and brown, apparently very low to low strength, Ashfield Shale						1.22m: B0°, un, sm, cly vn 1.33m: B0°, un, sm, cly vn 1.50-1.61m: B(x4), 0-5°, pl, sm, fe stn 1.71m: Cs, 10mm 1.88-2.20m: B(x3), 0-10°, pl, sm, fe stn	C	100	76	PL(A) = 0.2
2		SILTSTONE: grey and brown, 5-10% pale grey sandstone laminations, low strength with some very low strength bands, highly to moderately weathered, fractured and slightly fractured, Ashfield Shale						2.6m: B5°, un, sm, cbs vn 2.81-2.95m: J(x3), 50-80°, pl, sm, fe stn 3.00-3.30m: Ds, 300mm				PL(A) = 0.1
20									C	100	64	
3	3.3	SILTSTONE: dark grey and grey, 1-5% pale grey sandstone laminations, medium strength, fresh, fractured to slightly fractured, Ashfield Shale						3.60-3.66m: J(x2), 30°, pl, sm, cln 3.75m: J20°, pl, sm, cln				PL(A) = 0.7
19												PL(A) = 0.5
4								4.15m: J80-90°, un, ro, cln (4.10-4.20m) 4.35m: J40°, pl, sm, cln	C	100	100	
18								4.65m: B5°, pl, sm, cly vn 4.75m: B5°, pl, sm, cly vn 5.15m: J50°, pl, sm, cln 5.3m: J80°, un, sm, cln (5.15-5.45m) 5.55m: J80°, pl, sm, cln (5.40-5.68m)				PL(A) = 0.6
5												
17												PL(A) = 1.1
6								5.85-6.00m: J(x3), 40-60°, pl, sm, cly co 1mm 6.3m: J70-90°, un, sm, cln (6.00-6.65m)	C	100	79	
16								6.35m: J70°, pl, sm, cly vn 6.45m: J40°, pl, sm, cly vn	C	100	100	PL(A) = 0.7
7									C	100	100	
15												PL(A) = 1.3
8								7.92m: B0°, pl, ro, fe stn 8.25m: J80°, pl, sm, cln (8.15-8.40m)	C	100	100	
14												PL(A) = 0.4
9								8.65-8.92m: J(x4), 40-80°, pl, sm cln				
13									C	100	82	
	9.75	9.52-9.75m: pale grey sandstone bed, high strength						9.65-9.70m; B(x2), 5°, pl, sm, fe stn				PL(A) = 0.9

RIG: DTS 700 **DRILLER:** Terratest **LOGGED:** LDS **CASING:** HWT to 1.2m

TYPE OF BORING: Diatube to 0.16m, Solid flight auger (TC-Bit) to 1.16m, NMLC coring to 11.61m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.5m, Slotted PVC Casing 1.5-11.61m, Bentonite Plug 0.6-1.0m, Gravel 0.0-0.6m and 1.0-11.61m.

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.3 AHD
EASTING: 318298.5
NORTHING: 6245292
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 213805.02
DATE: 18 - 20/7/2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12		SILTSTONE: dark grey, 10-20% pale grey sandstone beds and laminations, medium and high strength, fresh, slightly fractured, Mittagong Formation *(continued)*						9.91m: J20°, pl, sm, fe stn 10.25m: J10-40°, cu, sm, cln 10.40-10.65m: J(x3), 40-60°, pl, sm, cln				PL(A) = 1.2
11								11.2m: J80-90°, pl, sm, cln (10.95-11.50m) 11.5m: J40°, pl, sm, cln	C	100	100	PL(A) = 0.6
	11.61	Bore discontinued at 11.61m Target Depth Reached										
10	12											
9	13											
8	14											
7	15											
6	16											
5	17											
4	18											
3	19											

RIG: DTS 700 **DRILLER:** Terratest **LOGGED:** LDS **CASING:** HWT to 1.2m

TYPE OF BORING: Diatube to 0.16m, Solid flight auger (TC-Bit) to 1.16m, NMLC coring to 11.61m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.5m, Slotted PVC Casing 1.5-11.61m, Bentonite Plug 0.6-1.0m, Gravel 0.0-0.6m and 1.0-11.61m.

SAMPLING & IN SITU TESTING LEGEND

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

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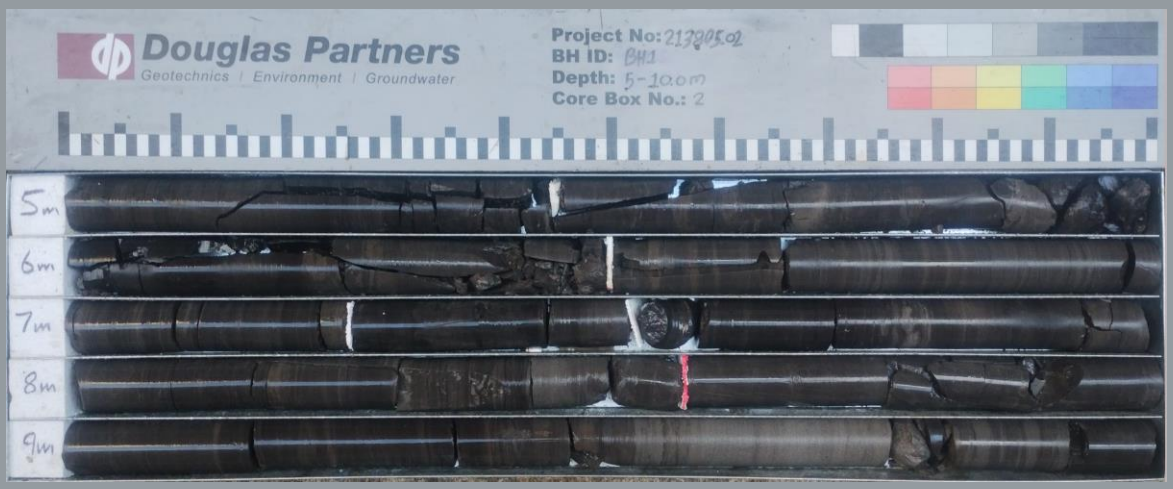
BORE: 1 PROJECT: BANKSTOWN JULY 2023

1.16 – 5.00 m

BORE: 1 PROJECT: BANKSTOWN JULY 2023



5.00 – 10.00 m

BORE: 1 **PROJECT: BANKSTOWN** **JULY 2023**

10.00 – 11.61 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.3 AHD
EASTING: 318338.9
NORTHING: 6245290.8
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 213805.02
DATE: 20 - 21/7/2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
			EW HW MW SW FS FR		Ex Low Very Low Low Medium High Very High Ex High		0.01 0.05 0.10 0.50 1.00	B - Bedding J - Joint S - Shear F - Fault				
22	0.14	CONCRETE SLAB: 140mm thick							A			
	0.3	FILL/GRAVEL: fine to coarse, igneous, dark grey							A			
	0.8	FILL/GRAVELLY CLAY: low plasticity, brown, fine to medium igneous gravel, w~PL										
21	1.0	Silty CLAY CI-CH: medium to high plasticity, grey-brown, w~PL, apparently stiff, residual							A			
	1.3	SILTSTONE: pale grey, apparently very low strength, Ashfield Shale						1.38m: J50°, pl, sm, cly vn 1.44-1.49m: Cs, 50mm 1.6m: Cs, 10mm 1.65m: J40°, pl, ro, fe stn 1.8m: J80-90°, un, ro, fe stn (1.73-1.90m) 2.3m: J20°, pl, cly vn 2.33m: B0°, pl, cly co 1mm 2.36m: Cs, 10mm 2.58m: B10°, pl, sm, fe stn 2.75m: Cs, 30mm 2.82m: CORE LOSS: 180mm 3.03-3.12m: Ds, 90mm 3.3m: J70-90°, un, ro, cln (3.25-3.35m) 3.45-3.60m: B(x3), 0-10°, un, sm, fe stn 3.76-3.98m: J(x4), 40-70°, pl, sm, fe stn 4.06-4.11m: B(x2), 0-10°, pl, sm, fe stn 4.36m: B0°, un, sm, cly vn 4.88m: J60°, pl, ro, cln 5m: CORE LOSS: 170mm 5.21-5.26m: J(x2), 30-50°, pl, ro, cln 5.55m: J50°, pl, sm, cln 5.75m: J70°, pl, sm, cln, partially ti 8.05m: J80°, pl, sm, cln 8.15m: J50°, pl, sm, cln 9.08-9.12m: J(x2) 30-50°, pl, sm, cln	A			
20	2.7	Below 1.7: low to medium strength, moderately weathered							C	100	78	PL(A) = 0.4 PL(A) = 0.2
	3.0	SILTSTONE: grey with orange-brown stains, very low strength, extremely weathered, highly fractured, Ashfield Shale							C	89	68	PL(A) = 0.1
19		SILTSTONE: dark grey and grey, low to medium strength, moderately and slightly weathered, fractured and slightly fractured, Ashfield Shale							C	89	80	PL(A) = 0.6
18	5.17	SILTSTONE: dark grey, medium strength, fresh, slightly fractured and unbroken, Ashfield Shale							C	100	100	PL(A) = 1 PL(A) = 0.4 PL(A) = 0.6
17									C	100	95	
16									C	100	95	PL(A) = 0.5
15	9.33	Below 8.90m: 20-30% pale grey sandstone beds and laminations SANDSTONE: (continued)							C	100	93	PL(A) = 2.4
14	10.0											
13												

RIG: DTS 700 **DRILLER:** Terratest **LOGGED:** LDS **CASING:** HWT to 1.1m

TYPE OF BORING: Diatubeto 0.14m, Solid flight auger (TC-Bit) to 1.3m BGL, NMLC coring to 12.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.6m, Slotted PVC Casing 1.6-12.10m, Bentonite Plug 0.8-1.2m, Gravel 0.0-0.8m and 1.2-12.10m.

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.3 AHD
EASTING: 318338.9
NORTHING: 6245290.8
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 213805.02
DATE: 20 - 21/7/2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12	10.1	SANDSTONE: fine to medium grained, grey, interbedded siltstone, 80% sandstone and 20% siltstone, medium to high strength, fresh, slightly fractured, Ashfield Shale						10.1m: J30°, pl, sm, cln 10.65m: J30-40°, cu, sm, cln	C	100	93	PL(A) = 0.8
11		SILTSTONE: pale grey and grey, interbedded sandstone, 70% siltstone and 30% sandstone, medium to high strength, fresh, slightly fractured, Ashfield Shale						11.4m: Ds, 50mm 11.5m: J40°, pl, sm, cln 11.9m: J60°, pl, sm, cln	C	100	85	PL(A) = 1.5
10	12.1	Bore discontinued at 12.1m Target Depth Reached										
9	13											
8	14											
7	15											
6	16											
5	17											
4	18											
3	19											

RIG: DTS 700 **DRILLER:** Terratest **LOGGED:** LDS **CASING:** HWT to 1.1m

TYPE OF BORING: Diatubeto 0.14m, Solid flight auger (TC-Bit) to 1.3m BGL, NMLC coring to 12.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.6m, Slotted PVC Casing 1.6-12.10m, Bentonite Plug 0.8-1.2m, Gravel 0.0-0.8m and 1.2-12.10m.

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: 2 **PROJECT: BANKSTOWN** **JULY 2023**

1.30 – 5.00 m

BORE: 2 **PROJECT: BANKSTOWN** **JULY 2023**

5.00 – 10.00 m

BORE: 2 **PROJECT: BANKSTOWN** **JULY 2023**

10.00 – 12.10 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.4 AHD
EASTING: 318362.8
NORTHING: 6245388.6
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 213805.02
DATE: 10-9-2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22	0.04	ASPHALTIC CONCRETE: 40mm thick							A/E			
		FILL/Gravelly CLAY: low plasticity, dark brown, fine to coarse igneous gravel, trace brick rubble, w~PL							A/E			
	0.6	Silty CLAY CI-CH: medium to high plasticity, orange-brown, w~PL, very stiff, residual							A/E			
21	1								S/E			12,13,16 N = 29
	2											
20	2.5	Silty CLAY CI-CH: medium to high plasticity, pale grey and red-brown, w~PL, very stiff to hard, residual							S			16,16,18 N = 34
	3	Below 3.5m: trace fine ironstone gravel, w<PL							A			
19	4											
	4.2	SILTSTONE: grey-brown, apparently very low to low strength							A			
18						▼		4.5m: CORE LOSS: 300mm				
	4.8	SILTSTONE: dark grey, low strength, highly then moderately weathered, fractured and slightly fractured, Ashfield Shale						4.85m: Ds, 30mm 4.94-5.00m: J(x2), 30-50°, pl, sm, fe stn 5m: Ds, 40mm 5.10-5.30m: B(x5), 0-10°, pl, sm, cly vn 5.30-5.52m: J(x4), 30-60°, pl, sm, cly co	C	78	17	
17	5											
	6.0	SILTSTONE: dark grey, medium strength, fresh, slightly fractured, Ashfield Shale						5.65m: J85°, pl, sm, fe stn, partially tight (5.40-5.80m) 5.91m: B10°, pl, sm, fe stn 6.05m: J60°, pl, sm, cln 6.52m: B10°, pl, sm, fe stn	C	100	100	PL(A) = 0.7
16	6											
	7	Between 7.3-8.0m: fractures likely induced by mechanical errors						7.52m: B0°, pl, sm, cly co 2mm 7.7m: J60°, pl, sm, cly co 2mm	C	79	77	PL(A) = 0.7
15	8							7.98m: Cs, 20mm 8m: CORE LOSS: 210mm				
	8.0											
	8.21	SILTSTONE: dark grey, 1-5% sandstone laminations, medium strength, fresh, fractured and slightly fractured, Ashfield Shale						8.49m: B0°, pl, sm, cly vn 8.82m: B0°, pl, sm, cly co 1mm 8.85m: Cs, 20mm 9.05-9.16m: Ds, 110mm 9.1m: J85°, pl, sm, cly co (8.90-9.20m) 9.35-9.42m: B(x3), 0-10°, pl, sm, cly co	C	100	76	PL(A) = 0.8
14	9								C	100	72	PL(A) = 0.7
13												

RIG: Hanjin DB8 **DRILLER:** Terratest **LOGGED:** JDB **CASING:** HW to 3.5m

TYPE OF BORING: Solid flight auger (TC-Bit) to m, NMLC coring to 12.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.2m, Slotted PVC Casing 1.2-10.52m, Bentonite Plug 0.5-0.9m, Gravel 0.0-0.5m and 0.9-10.52m.

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.4 AHD
EASTING: 318362.8
NORTHING: 6245388.6
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 213805.02
DATE: 10-9-2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12								1mm 10.10-10.41m: B(x5), 0-10°, pl, sm, cly co 1-2mm	C	100	72	PL(A) = 0.5
	10.52	Bore discontinued at 10.52m Discontinued due to mecahnical errors										
11	11											
10	12											
9	13											
8	14											
7	15											
6	16											
5	17											
4	18											
3	19											

RIG: Hanjin DB8 **DRILLER:** Terratest **LOGGED:** JDB **CASING:** HW to 3.5m

TYPE OF BORING: Solid flight auger (TC-Bit) to m, NMLC coring to 12.1m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: Groundwater well installed upon completion. Solid PVC Casing 0.0-1.2m, Slotted PVC Casing 1.2-10.52m, Bentonite Plug 0.5-0.9m, Gravel 0.0-0.5m and 0.9-10.52m.

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: 3 **PROJECT: BANKSTOWN** **SEPT 2023**

4.50 – 9.00 m

BORE: 3 **PROJECT: BANKSTOWN** **SEPT 2023**

9.00 – 10.52 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.4 AHD
EASTING: 318363.6
NORTHING: 6245388.2
DIP/AZIMUTH: 90°/--

BORE No: BH3A
PROJECT No: 213805.02
DATE: 17-9-2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22	0	0.0-9.0m: Refer to Borehole Log BH3										
21	1											
20	2											
19	3											
18	4											
17	5											
16	6											
15	7											
14	8											
13	9	SILTSTONE: dark grey, 1-5% pale grey sandstone laminations, low to medium strength, fresh, slightly fractured, Ashfield Shale						9.04m: B0°, pl, sm, cly vn 9.1m: B0°, pl, sm, cly vn 9.5m: J20°, pl, sm, cln	C	100	90	PL(A) = 0.3
	9.0											

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** LL **CASING:** HW to 4m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 9m, NMLC Coring to 15.00m

WATER OBSERVATIONS: Groundwater seepage observed at 4.0m whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.4 AHD
EASTING: 318363.6
NORTHING: 6245388.2
DIP/AZIMUTH: 90°/--

BORE No: BH3A
PROJECT No: 213805.02
DATE: 17-9-2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 0.05 0.10 0.50 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12		SILTSTONE: dark grey, 1-5% pale grey sandstone laminations, low to medium strength, fresh, slightly fractured, Ashfield Shale *(continued)*						10.48-10.90m: J(x4), 60-80°, pl, sm, cly vn	C	100	90	
11												PL(A) = 0.4
									C	100	74	PL(A) = 0.3
								11.57-11.64m: Ds, 70mm				
12												PL(A) = 0.5
	12.16	SANDSTONE: fine to medium, grey, 1-5% dark grey siltstone laminations and beds, high strength, fresh, slightly fractured to unbroken, Mittagong Formation						12.6m: B0°, pl, ro, cly vn				
13												PL(A) = 2.6
									C	100	100	
								13.71m: B0-5°, un, sm, cly vn				
14												PL(A) = 1.7
								14.32m: B5°, pl, ro, cly vn				
												PL(A) = 1.1
15	15.0	Bore discontinued at 15.0m Target Depth Reached										
16												
17												
18												
19												

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** LL **CASING:** HW to 4m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 9m, NMLC Coring to 15.00m

WATER OBSERVATIONS: Groundwater seepage observed at 4.0m whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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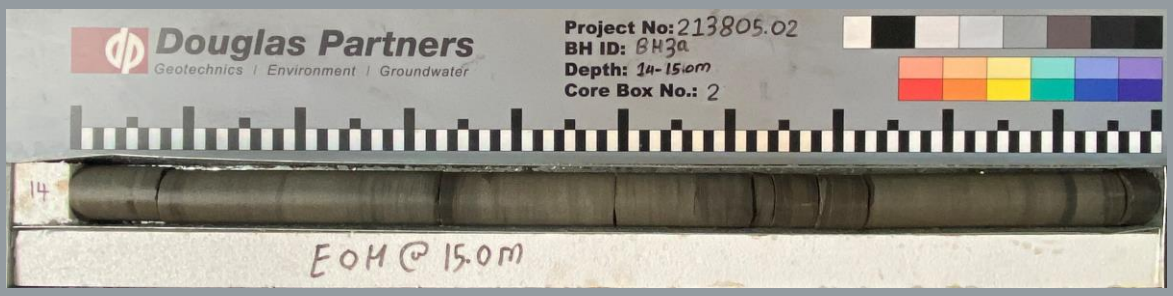
BORE: 3A PROJECT: BANKSTOWN SEPT 2023

9.00 – 14.00 m

BORE: 3A PROJECT: BANKSTOWN SEPT 2023



14.00 – 15.00 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.5 AHD
EASTING: 318390.3
NORTHING: 6245384.6
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 213805.02
DATE: 17-9-2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
22	0.04	ASPHALTIC CONCRETE: 40mm thick							A/E			
	0.2	FILL/GRAVELLY SAND: medium to coarse, dark brown, fine to coarse igneous grvel, dry, Roadbase							A/E*			
21	1 1.0	FILL/Silty CLAY: medium to high plasticity, brown mottled pale grey, trace fine ironstone gravel, w<PL, apparently stiff, possible reworked natural							A/E			
									S			6,6,9 N = 15
		Silty CLAY CI-CH: medium to high plasticity, orange-brown mottled pale grey, w~PL, stiff to very stiff, residual							A			
	2								A			
20		Below 2.4m: with fine to coarse ironstone gravel and iron-indurated bands							A			
									S			11,14,16 N = 30
	3 3.0	Silty CLAY CI-CH: medium to high plasticity, red-brown, with fine to medium ironstone gravel, w~PL, hard, residual										
19	4	Below 4.0m: trace ironstone cobbles and fine siltstone gravel							S			12,12,24 N = 36
	4.4	SILTSTONE: brown and dark grey, low strength, fractured, highly to moderately weathered, Ashfield Shale						4.56m: J(x2), 60°, pl, ro, fe stn 4.63m: Cs, 20mm 4.69m: Cs, 10mm 4.72m: J80°, pl, sm, fe stn 4.75m: B5°, pl, sm, fe stn 4.87-5.08m: Ds, 210mm 5.15m: Ds, 30mm 5.18-5.27m: J(x3) 30-50°, un, ro, fe stn 5.34m: fg, 40mm 5.48-5.62m: Ds, 140mm 5.78-5.94m: J70-90°, un, ro, fe stn 6.49-6.61m: J90°, pl, ro, cln, partially tight	C	100	58	PL(A) = 0.2 PL(A) = 0.1 PL(A) = 0.2
18	5											
	5.62	SILTSTONE: dark grey, 20% grey, fine grained sandstone laminations, low then medium strength, fractured, slightly weathered then fresh, Ashfield Shale										
17	6											
	7	7.55-8.21m: high strength band						7.4m: J40°, pl, sm, cln 7.55m: J30°, pl, sm, cln				PL(A) = 0.3
16	8							8.21m: B0°, pl, sm, cln 8.20-8.45m: J(x2), 80°, pl, sm, cln	C	100	99	PL(A) = 2 PL(A) = 0.8
15	9							8.88m: B10°, un, sm, cly vn 9.00-9.51m: J90°, pl, sm, cln, partially tight				PL(A) = 0.3
14												
13												

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** LL **CASING:** HWT to 4.2m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 4.45m, Rotary to 4.55m, NMLC Coring to 15.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: *Field replicate BD1/20230917 taken at 0.5-0.6m depth. Groundwater well installed upon completion. Solid PVC Casing 0.0-3.18m, Slotted PVC Casing 3.18-15.18m, Bentonite Plug 2.0-2.6m, Gravel 0.0-2.0m and 2.6-15.18m.

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.5 AHD
EASTING: 318390.3
NORTHING: 6245384.6
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 213805.02
DATE: 17-9-2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12		SILTSTONE: dark grey, 20% grey, fine grained sandstone laminations, low then medium strength, fractured, slightly weathered then fresh, Ashfield Shale *(continued)*						10.61-10.62m: B(x2), 0-10°, un, sm, fe stn 10.74-10.90m: J80°, pl, sm, cln 10.80-11.15m: J70°-90°, ir, sm, cln 11.31-11.41m: J70°, ir, sm, cln 11.43m: Cs, 30mm 11.62m: J45°, pl, sm, cln 11.65-11.88m: J70-90°, un, sm, cln, partially tight	C	100	88	PL(A) = 0.7 PL(A) = 0.5 PL(A) = 0.5 PL(A) = 0.4
11												
12	12.23	SANDSTONE: fine to medium grained, grey, 10% dark grey siltstone laminations, high and high to very high strength, slightly fractured to unbroken, fresh, Mittagong Formation						12.11-12.18m: fg, 70mm 12.18-12.23m: Cs, 50mm 12.3m: J80°, ir, ro, cln 12.52m: B10°, pl, ro, cly vn 12.75-13.12m: J80°, pl, ti, ca vnr 13.81-14.04m: J80°, pl, ti, ca vnr	C	100	99	PL(A) = 1.6 PL(A) = 3.2 PL(A) = 3
13												
14												
15	15.18	Bore discontinued at 15.18m Target Depth Reached										PL(A) = 1.3
16												
17												
18												
19												

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** LL **CASING:** HWT to 4.2m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 4.45m, Rotary to 4.55m, NMLC Coring to 15.18m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: *Field replicate BD1/20230917 taken at 0.5-0.6m depth. Groundwater well installed upon completion. Solid PVC Casing 0.0-3.18m, Slotted PVC Casing 3.18-15.18m, Bentonite Plug 2.0-2.6m, Gravel 0.0-2.0m and 2.6-15.18m.

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: 4 PROJECT: BANKSTOWN SEPT 2023

4.55 – 8.00 m

BORE: 4 PROJECT: BANKSTOWN SEPT 2023

8.00 – 13.00 m

BORE: 4 PROJECT: BANKSTOWN SEPT 2023

13.00 – 15.18 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.5 AHD
EASTING: 318363.3
NORTHING: 6245364.2
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 213805.02
DATE: 24-9-2023
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22	0.05	ASPHALTIC CONCRETE: 50mm thick							E			
	0.2	FILL/Sandy GRAVEL: fine to coarse, igneous, dark grey, fine to medium sand, dry, Roadbase							E			
	0.7	FILL/CLAY: low to medium plasticity, dark brown, with fine sand, w~PL, appears generally in a stiff condition							E			
21	1	Silty CLAY CI-CH: medium to high plasticity, pale brown and grey, w~PL, stiff to very stiff							S			8,7,9 N = 16
	2	Below 2.0m: very stiff to hard, with fine to coarse ironstone gravel							A			
20									A			16,21,18 N = 39
	3								S			
19								Unless otherwise stated, rock is fractured along planar beddings dipping 0-10°	A			
	3.8											
	3.92	SILTSTONE: dark brown, apparently very low strength, Ashfield Shale										
18	4											
	4.55	SILTSTONE: brown and grey-brown, 1-5% ironstone bands, very low strength, highly weathered, fractured, Ashfield Shale										
17	5	SILTSTONE: dark grey, medium strength, slightly weathered then fresh, slightly fractured, Ashfield Shale						4.38m: J30°, un, ro, fe stn 4.55m: J70°, pl, ro, cly vn 4.65m: J45°- 70°, cu, ro, fe stn 4.72-4.97m: B(x6) 0°, fe, cly co 2-5mm 5.27-5.4m: Ds, 130mm 5.42m: J45°, pl, ro, cln 5.6 & 5.65m: J(x2) 45°, pl, ro, cly vn 5.85-5.90m: Ds, 50mm	C	100	50	PL(A) = 0.6 PL(A) = 0.5
	6											PL(A) = 0.5
16	7							7.05-7.15m: J45°-70°, cu, ro, cln 7.25m: J60°, un, ro, cly vn 7.6-7.8m: J80°, pl, ro, cln	C	100	95	PL(A) = 2.2
	7.8	SILTSTONE: dark grey, 10-20% pale grey, fine grained sandstone beds and laminations, medium strength, fresh, slightly fractured with some fractured bands, Ashfield Shale										PL(A) = 0.9
15	8											
14	9							8.75-9.0m: J80°, pl, ro, cln				
13	10.0								C	100	90	PL(A) = 0.8

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** JDB/LDS **CASING:** HW to 3.3m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 3.8m, Rotary to 3.92m, NMLC Coring to 15.00m

WATER OBSERVATIONS: Groundwater seepage observed at 3.8m whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.5 AHD
EASTING: 318363.3
NORTHING: 6245364.2
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 213805.02
DATE: 24-9-2023
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
12		SILTSTONE: dark grey, 1-5% pale grey, fine grained sandstone laminations, medium strength, fresh, slightly fractured, Ashfield Shale						10.08m: B0°, pl, ro, cly vn 10.15m: J45°, cu, ro, cln 10.45-10.65m: J70°, pl, sm, cln 10.75-11.0m: J90°, pl, sm, ti				PL(A) = 0.5
11									C	100	90	
11								11.27-11.30m: fg, cbs band 11.39-11.45m: Cs, 60mm 11.43m: J45°, pl, sm, cly 11.62m: J70°, un, ro, cln 11.8m: J85°, pl, sm, cln 11.83m: J45°, pl, sm, cbs cly 12.07m: J45°, un, ro, cln 12.38m: B5°, pl, sm, cly vn 12.6m: B0°, pl, sm, cly vn				PL(A) = 0.6
12												
10	12.6	SANDSTONE: fine to medium grained, pale grey, very high strength, fresh, unbroken, Mittagong Formation										PL(A) = 1.5
13												PL(A) = 3.5
9									C	100	87	
14								13.78m: J90°, pl, he				
8												PL(A) = 3.2
15	15.0	Bore discontinued at 15.0m Target Depth Reached										
7												
16												
6												
17												
5												
18												
4												
19												
3												

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** JDB/LDS **CASING:** HW to 3.3m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 3.8m, Rotary to 3.92m, NMLC Coring to 15.00m

WATER OBSERVATIONS: Groundwater seepage observed at 3.8m whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BORE: 5 PROJECT: BANKSTOWN SEPT 2023

3.92 – 7.00 m

BORE: 5 PROJECT: BANKSTOWN SEPT 2023

7.00 – 12.00 m

BORE: 5 PROJECT: BANKSTOWN SEPT 2023

12.00 – 15.00 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.7 AHD
EASTING: 318313.8
NORTHING: 6245358.4
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 213805.02
DATE: 18 - 19/9/2023
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
22	0.05	ASPHALTIC CONCRETE: 50mm thick							E			
	0.15	FILL/Sandy GRAVEL: fine to coarse, igneous, dark grey, fine to medium sand, dry, Roadbase							E*			
	0.6	FILL/CLAY: low to medium plasticity, dark brown, with fine sand, w~PL, appears generally in a stiff condition										
21	1	Silty CLAY CI-CH: medium to high plasticity, pale brown and grey, w~PL, stiff to very stiff							E			
		Below 1.3m: very stiff to hard							E			
20	2								A			
									A			
									S			16,21,18 N = 39
	3	Below 3.1m: grading into extremely weathered siltstone										
	3.5	SILTSTONE: dark grey and orange-brown, low strength with very low strength bands, highly to moderately weathered, fractured, Ashfield Shale				▽		3.6m: J40-60°, cu, sm, cly vn 3.65-4.00m: J(x3), 70-90°, pl, ro, fe stn 4.00-4.13m: Ds, 130mm	A			
19	4								C	100	82	PL(A) = 0.2
	4.35	SILTSTONE: dark grey and grey, low then medium strength, fresh, slightly fractured with some fractured bands, Ashfield Shale						4.89m: B5°, un, sm, cly vn				PL(A) = 0.2
18	5											
								5.81m: B10°, un, sm, cly vn 5.83m: B5°, pl, sm, cly vn 6.05m: J40°, pl, sm, fe stn, (fg, 80mm) 6.17m: B5°, un, sm, cly vn	C	100	95	PL(A) = 0.4
17	6											
	7							6.98m: B0°, pl, sm, cly co 2mm 7.01m: J40°, pl, sm, cln 7.25-7.71m: J(x3), 70-90°, un, sm, cln				PL(A) = 0.6
16												
								8.00-8.06m: J(x2), 30-60°, pl, sm, cln				PL(A) = 0.6
15	8											
									C	100	100	PL(A) = 0.8
14	9							8.95m: J40°, pl, sm, cln				
	9.4	SILTSTONE: continued										PL(A) = 0.5
13									C	100	100	
	10.0							9.71m: B0°, pl, ti				

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** JDB **CASING:** HW to 3.5m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 3.5m, Rotary to 3.58m, NMLC Coring to 20.34m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: *Blind duplicate BD2/20230919 taken at 0.4-0.5m depth

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.7 AHD
EASTING: 318313.8
NORTHING: 6245358.4
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 213805.02
DATE: 18 - 19/9/2023
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
12		SILTSTONE: dark grey, 5-10% pale grey, fine grained sandstone laminations, medium to high strength, fresh, slightly fractured and unbroken, Ashfield Shale						10.73m: B5°, pl, sm, cly co 2mm	C	100	100	PL(A) = 0.8 PL(A) = 1.1 PL(A) = 0.9
11												
11								11.66m: B0°, pl, sm, cly vn 11.73-11.78m: J(x3), 60-70°, pl, sm, cln 11.82-11.87m: Cs, 50mm 12.43m: B0°, pl, sm, cly co 2mm 12.56m: B5-15°, un, ro, cly vn 12.71m: J40°, pl, sm, cln 13.16m: B0°, pl, sm, cly co 2mm	C	100	91	PL(A) = 1.1 PL(A) = 1.6 PL(A) = 1.2 PL(A) = 3.6 PL(A) = 3
12												
10	12.7	INTERBEDDED SANDSTONE AND SILTSTONE: 70-80% pale grey, fine to medium grained sandstone interbedded with 20-30% dark grey siltstone, high and very high strength, fresh, slightly fractured then unbroken, Mittagong Formation										
13												
9												
14												
8												
15								>>	C	100	100	PL(A) = 1.3
7												
16												
6												
17												PL(A) = 1.6
5								17.7m: B0°, pl, sm, cly vn				
18												PL(A) = 2
4									C	100	100	
19								>>				PL(A) = 3
3												PL(A) = 2.2

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** JDB **CASING:** HW to 3.5m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 3.5m, Rotary to 3.58m, NMLC Coring to 20.34m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: *Blind duplicate BD2/20230919 taken at 0.4-0.5m depth

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Altis Compass Centre Redevelopment
LOCATION: 83-99 North Terrace, Bankstown

SURFACE LEVEL: 22.7 AHD
EASTING: 318313.8
NORTHING: 6245358.4
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 213805.02
DATE: 18 - 19/9/2023
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
									C	100	100	
	20.35	Bore discontinued at 20.34m Target Depth Reached										

RIG: Comacchio 305 **DRILLER:** LC **LOGGED:** JDB **CASING:** HW to 3.5m

TYPE OF BORING: Solid Flight Auger (TC-Bit) to 3.5m, Rotary to 3.58m, NMLC Coring to 20.34m

WATER OBSERVATIONS: No free groundwater observed whilst augering.

REMARKS: *Blind duplicate BD2/20230919 taken at 0.4-0.5m depth

SAMPLING & IN SITU TESTING LEGEND

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

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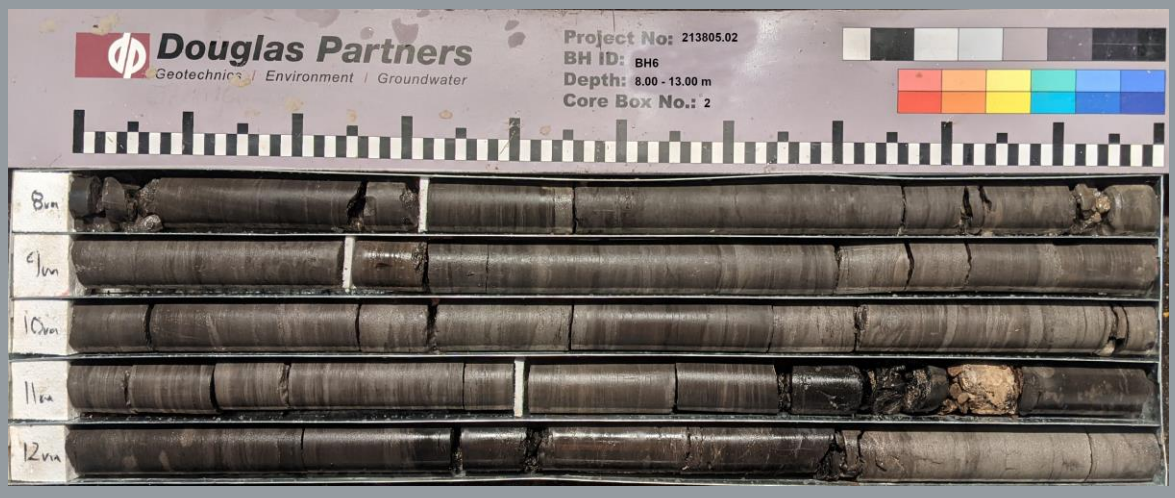
BORE: 6 PROJECT: BANKSTOWN SEPT 2023

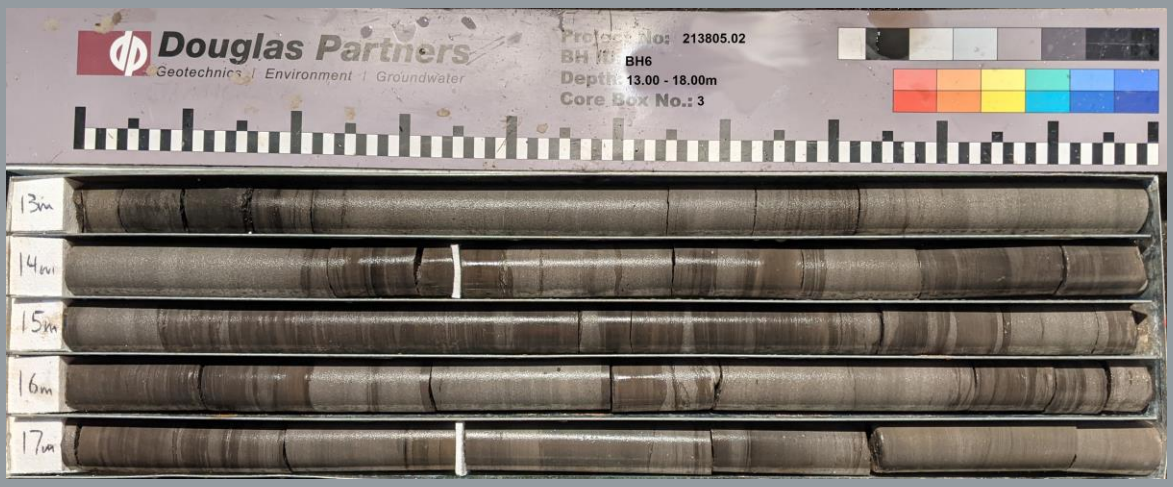
3.58 – 8.00 m

BORE: 6 PROJECT: BANKSTOWN SEPT 2023



8.00 – 13.00 m

BORE: 6 PROJECT: BANKSTOWN SEPT 2023



13.00 – 18.00 m

BORE: 6 PROJECT: BANKSTOWN SEPT 2023

18.00 – 20.35 m

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Redevelopment of Compass Centre
LOCATION: 83-89 North Terrace, Bankstown, NSW 2200

SURFACE LEVEL: 22.9 AHD
COORDINATE: E:3183467.0, N:6245284.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH301
PROJECT No: 213805.05
DATE: 12/05/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
12/05/25 No free groundwater whilst augering		0.18	CONCRETE; 180mm thick.						ES		0.18			Bentonite - 100mm dia	
			FILL / Sandy CLAY trace gravel: pale brown; low to medium plasticity; fine to coarse sand; fine to coarse, igneous gravel.		FILL				ES		0.30				
		0.60	FILL / CLAY trace sand trace gravel: brown; medium plasticity; fine to coarse sand; fine to coarse, igneous gravel.		FILL	ND			ES		0.60 0.70				
	22	1.00	CLAY (CI-CH) trace gravel: red-brown; medium to high plasticity; fine to coarse, ironstone gravel.		RS	(St)	w=PL		ES		0.80 1.00				
											1.10				
									D		1.20 1.30				
	21	2													
									D		1.90 2.00				
			2.40m: pale grey mottled orange-brown, becoming extremely weathered material			(VSt) - (H)			D		2.40 2.50				
	20	3									3				
		3.20	Continued as rock log												
	19	4									4			Gravel - 100mm dia	
	18														

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: XC
OPERATOR: Terratest (J. Wright)
LOGGED: RM
METHOD: DT to 0.18m, SFA (100) to 3.4m, NMLC to 9.73m
CASING: HWT to 3.4m
REMARKS: Blank 0-2.5m, screen 2.5-8.5m, Bentonite 0-2m, Gravel 2-9.73m, Hole dia 100mm

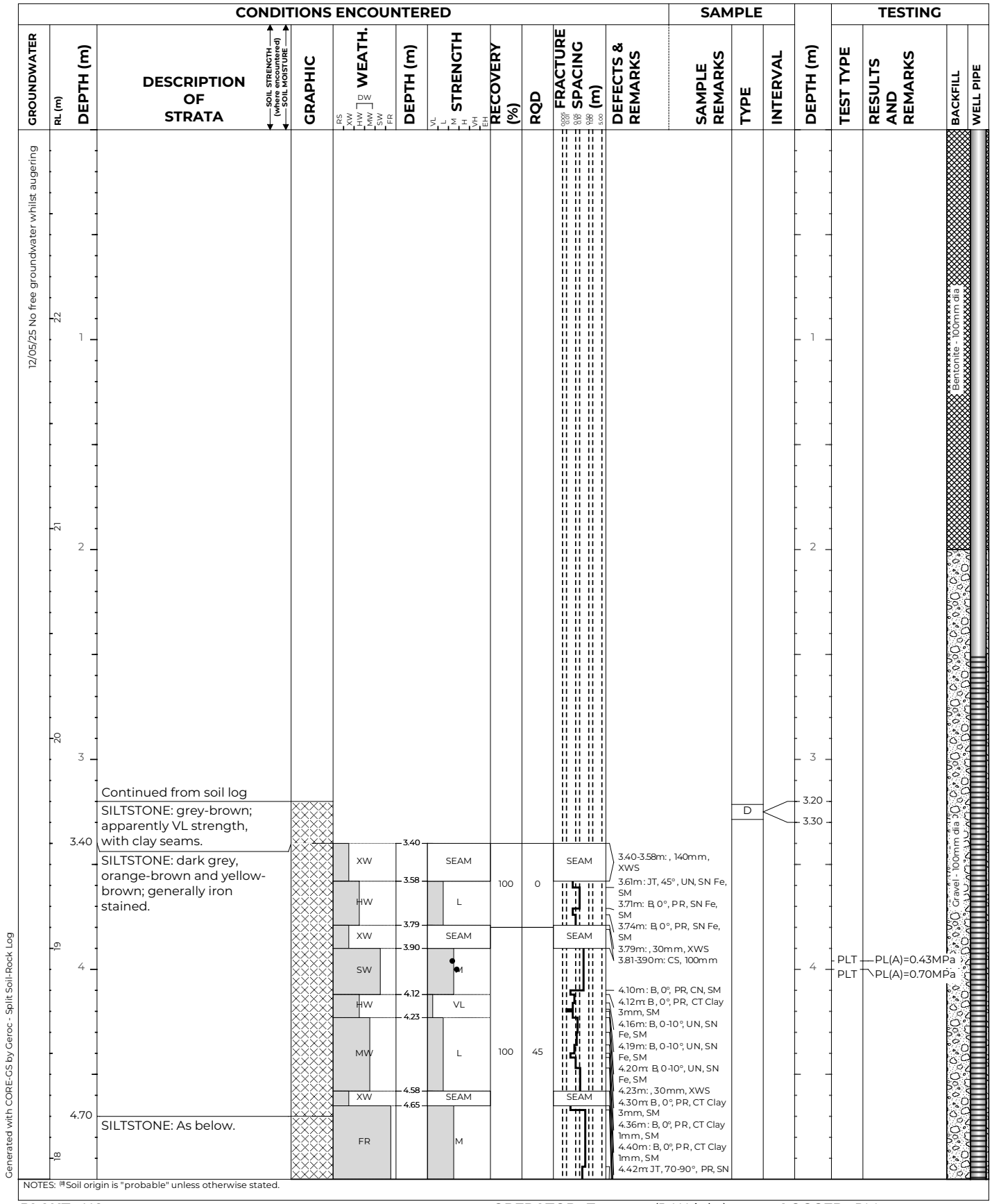
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Redevelopment of Compass Centre
LOCATION: 83-89 North Terrace, Bankstown, NSW 2200

SURFACE LEVEL: 22.9 AHD
COORDINATE: E:3183467.0, N:6245284.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH301
PROJECT No: 213805.05
DATE: 12/05/25
SHEET: 2 of 3



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

PLANT: XC
OPERATOR: Terratest (J. Wright)
LOGGED: RM
METHOD: DT to 0.18m, SFA (100) to 3.4m, NMLC to 9.73m
CASING: HWT to 3.4m
REMARKS: Blank 0-2.5m, screen 2.5-8.5m, Bentonite 0-2m, Gravel 2-9.73m, Hole dia 100mm

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Redevelopment of Compass Centre
LOCATION: 83-89 North Terrace, Bankstown, NSW 2200

SURFACE LEVEL: 22.9 AHD
COORDINATE: E:3183467.0, N:6245284.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH301
PROJECT No: 213805.05
DATE: 12/05/25
SHEET: 3 of 3

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
		5.00	SILTSTONE: dark grey; with 1-5% fine grained pale grey sandstone laminations.		FR		M	100	45		Fe, (4.27-4.58) 4.47m: B, 0°, PR, VNR Clay, SM 4.58-4.65m: , 70mm, XWS 4.67m: JT, 60°, PR, INF Clay, SM 4.94m: JT, 80°, PR, CN, SM, Tl, (4.70-5.20) 5.10m: B, 0°, UN, CN, SM 5.12m: B, 0°, PR, CT Clay, SM 5.17m: B, 0°, PR, VNR Clay, SM 5.33m: B, 0°, UN, CN, SM 5.42m: JT, 10°, PR, CN, SM 5.51m: JT, 60°, CU, Tl, (5.46-5.55) 5.62m: B, 0°, PR, CN, SM 5.74m: JT, 80°, IR, CN, SM 5.80m: CS, 30mm 5.89m: JT, 45°, ST, CN, SM 5.94m: B, 10°, ST, CN, SM 6.12m: B, 0°, PR, CN, SM							
	17	6						100	77		6.52m: B, 0°, PR, CT Clay 3mm, SM 6.73m: B, 0°, PR, CN, SM 6.90m: JT, 80°, PR, CN, SM, Tl, (6.84-7.00)				6	PLT	PL(A)=0.55MPa PL(A)=0.63MPa		
	16	7						100	100		7.11m: B, 5°, UN, CN, SM 7.37m: JT, 70-90°, CU, CN, SM, Tl 7.63m: B, 0°, PR, CN, SM				7				
	15	8									7.95m: JT, 70-90°, CU, Tl 8.25m: B, 0°, PR, CN, SM				8	PLT	PL(A)=0.98MPa PL(A)=0.51MPa		
	14	9						100	98		8.65m: B, 0°, PR, CN, SM 8.77m: JT, 70°, PR, INF Clay 1mm, Tl, (8.65-8.90) 8.89m: S, 45-70°, ST, Tl, (8.83-8.95) 9.02m: S, 70-80°, CU, Tl, (8.85-9.20) 9.27m: S, 45-90°, CU, Tl, (9.20-9.35) 9.30m: JT, 45°, CU, Tl				9				
	13		Borehole discontinued at 9.73m depth. Target depth reached.													PLT	PL(A)=0.57MPa		

Gravel - 100mm dia

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

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

PLANT: XC
OPERATOR: Terratest (J. Wright)
LOGGED: RM
METHOD: DT to 0.18m, SFA (100) to 3.4m, NMLC to 9.73m
CASING: HWT to 3.4m
REMARKS: Blank 0-2.5m, screen 2.5-8.5m, Bentonite 0-2m, Gravel 2-9.73m, Hole dia 100mm

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Essence Project Management Pty Ltd
PROJECT: Proposed Redevelopment of Compass Centre
LOCATION: 83-89 North Terrace, Bankstown, NSW 2200

SURFACE LEVEL: 22.9 AHD
COORDINATE: E:3183467.0, N:6245284.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH301
PROJECT No: 213805.05
DATE: 12/05/25
SHEET: 1 of 1

3.40-8.00 m depth

8.00-9.73 m depth

Appendix D

Summary of Results

Table K2 : Summary of Laboratory Results – Groundwater

		Physical Parameters		Anions & Cations - Dissolved			Metals - Dissolved								TRH			BTEX						PAH		OCP		OPP		PCB	PCB	VOC (excluding BTEX)								Phenols
		Total Suspended Solids	Total dissolved solids	Calcium	Magnesium	Hardness	Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	F1 [C6-C10 less BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Benzo-A-Pyrene (BaP)	Total Positive PAH	DDT	Sum of analysed OCP	Parathion	Sum of analysed OPP	Aroclor 1016	Sum of analysed PCB	tetrachloroethene	1,1,2-trichloroethane	1,1,2-trichloroethylene	1,1-Dichloroethene	Vinyl Chloride	Chloroform	Sum of analysed VOC	Total Phenolics (as phenol)
	PQL	5000	5,000	500	500	3000	1	0.1	1	1	1	0.05	1	1	10	50		100	1	1	1	1	2	1	0.1	0.1	0.001	0.001	0.004	0.004	0.01	0.01	1	1	1	1	10	1	1	2
ANZG (2018) 95% LOP Freshwater							13	0.2	1	1.4	3.4	**0.06**	11	8					950	180	80	350	75		**0.1**		**0.000**	0.001	0.004			**0.01**	70	6,500	330	700	100	370		320
ANZG (2018) 99% LOP Freshwater (Hardness Adjusted Values for Metals)								2		-	91.2		99.4	72.3																										
NEPC (2013) HSL 4-8m															NL	NL			30,000	NL	NL			NL																
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Current Investigation																																								
BH2	26/05/2025						2	<0.1	<1	<1	<1	<0.05	2	7	<10	<50	<100	<100	<1	<1	<1	<1	<2	<3	<0.1	<0.1							<1	<1	<1	<1	<10	<1	<1	-
BH3	26/05/2025	-	-	-	-	-	<1	<0.1	<1	<1	<1	<0.05	2	2	<10	<50	<100	<100	<1	<1	<1	<1	<2	<3	<0.1	<0.1	-	-	-	-	-	-	<1	<1	<1	<1	<10	<1	<1	-
BH301 (BH5)	26/05/2025	-	-	-	-	-	6	<0.1	<1	5	<1	<0.05	3	<1	<10	<50	<100	<100	<1	<1	<1	<1	<2	<3	<0.1	<0.1	-	-	-	-	-	-	<1	<1	<1	<1	<10	<1	<1	-
BD1/202505 28	26/05/2025	-	-	-	-	-	6	<0.1	<1	5	<1	<0.05	3	<1	<10	<50	<100	<100	<1	<1	<1	<1	<2	<3	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Previous Investigation (Douglas, 2023)																																								
BH1	01/11/23	**230,000**	**14,000,000**	**96,000**	**430,000**	**2,000,000**	<1	<0.1	<1	<1	<1	<0.05	16	23	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.001	<0.001	<0.004	<0.004	<0.01	<0.01	<1	<1	<1	<1	<10	<1	<1	<0.05
BH2	01/11/23						<1	<0.1	<1	2	<1	<0.05	17	22	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1															
BH4	01/11/23	**470,000**	**20,000,000**	**99,000**	**510,000**	**2,300,000**	<1	<0.1	<1	3	<1	<0.05	8	21	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.001	<0.001	<0.004	<0.004	<0.01	<0.01	<1	<1	<1	<1	<10	<1	<1	<0.05

Notes:

- QA/QC replicate of sample listed directly below the primary sample

PQL Practical quantitation limit

- No criterion / not defined / not tested / not applicable

Shaded cell is exceedance of guideline value

Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Clay 4-8m

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]

ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection

The lowest detected Hardness value was utilised in the calculation of the Hardness Adjusted ANZG(2018) 99% LOP Freshwater Values for Metals.

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Table D2: Summary of Laboratory Results – Soil Vapour.

		Field PID Reading	Isopropyl Alcohol	Vinyl chloride	Trichloroethene	1,1-Dichloroethene	trans-1,2-dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Benzene	Toluene	Ethylbenzene	m-& p-Xylene	o-Xylene	Naphthalene	C5-C8-Aliphatic	C9-C12-Aliphatic	C9-C10-Aromatic	F1-BTEX	F2-NAPHTHALENE
	PQL		12	0.8	1.6	2	2	2	3.4	1.6	1.9	2.2	4.3	2.2	2.6	200	50	100	200	40
NEPC (2013) Interrim HIL Low - high density residentual A/B and Soil Vapour HSL for Vapour Intrusion, Clay 0 - 1 m				30				80	2000	1000	1600000	420 000	280 000		10000				230000	180000
Sample ID	Sample Date	ppm	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
Current Results																				
SV1	22/05/2025	1	20	<0.8	<1.6	<2	<2	<2	<3.4	<1.6	**2**	<2.2	<4.3	<2.2	<2.6	<200	<50	<100	<200	<40
BD1/20250522	22/05/2025	1	20	<0.8	**2**	<2	<2	<2	<3.4	<1.6	**2**	<2.2	<4.3	<2.2	<2.6	-		-	-	-
SV2	26/05/2025	0	20	<0.8	<1.6	<2	<2	<2	<3.4	<1.6	<1.9	<2.2	<4.3	<2.2	<2.6	<200	<50	<100	<200	<40
SV3	26/05/2025	0	<12	<0.8	<1.6	<2	<2	<2	<3.4	<1.6	<1.9	<2.2	<4.3	<2.2	<2.6	<200	<50	<100	<200	<40
Previous Results																				
SV209	03/11/2023	1	690	<0.8	<1.6	<2	<2	<2	<3.4	**6**	**10**	**20**	**89**	**10**	**30**	-	-	-	-	-
BD1	03/11/2023	1	550	<0.8	<1.6	<2	<2	<2	<3.4	**5**	**10**	**8**	**20**	**7**	<2.6	-	-	-	-	-
SV210	03/11/2023	2	240	<0.8	<1.6	<2	<2	<2	**8**	**20**	**38**	**20**	**44**	**10**	<2.6	-	-	-	-	-

Notes:

*	QA/QC replicate of sample listed directly below the primary sample
~	Isopropyl alcohol used as QA analyte and hence detections have not been considered from a site suitability perspective
PQL	Practical quantitation limit
-	No criterion / not defined / not tested / not applicable
	Shaded cell is an exceedance of the guideline value
	Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded
	NEPC (2013) Table 1A(2) Residential B soil vapour VOCC HILs
	NEPC (2013) Table 1A(5) Low - high density residentual A/B Soil Vapour HSL for Vapour Intrusion, Clay 0 - 1 m
	USEPA Regional Screening Level for commercial/industrial landuse, air THQ=1.0, TR 10-5
	USEPA Regional Screening Level for sub-slab commercial/industrial landuse, air THQ=1.0,TR= 10-5, slab attenuation factor 0.1

Appendix E

Field Sheets and Logs

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Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location					Project Number	
Well Construction Details	Well ID	1	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	21/5/25			Purged By	DW
Purge Method / Equipment	Twister pump				
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	N/Interface	
GW Level (pre-purge)	4.46	m bgl	Observed Well Depth	10.5	m bgl
Height of Water Column (H)	6.04	m bgl	Estimated Bore Volume*	35-40	L
GW Level (post-purge)	4.348	m bgl	Total Volume Purged**	60-70	L
Appearance/Comments	~~dark~~ grey bleeding clear, no sheen, no odour				

Sampling Details				
Date / Time / Weather Conditions			Sampled By	
Sampling Method / Equipment				
WQM Model		WQM Calibration Date		
Product observed / Thickness	mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	m bgl	Observed Well Depth		m bgl
Height of Water Column	m bgl	Estimated Bore Volume*		L
GW Level (post sample)	m bgl	Total Volume of Micro-Purged		L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)		m bgl,				
Sample Observations (e.g. colour, sediment, sheen, odour)						
Sample ID						
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass		Plastic		PFAS (no teflon)	
	Metals (F/UF) (HNO3)		Phenols/COD/NH3 (H2SO4)		Vials (HCl)	
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

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Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location					Project Number	
Well Construction Details	Well ID	2	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	22/5/25			Purged By	MW
Purge Method / Equipment	Twister pump				
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	N) Interface	
GW Level (pre-purge)	4.51	m bgl	Observed Well Depth	10.5	m bgl
Height of Water Column (H)	5.99	m bgl	Estimated Bore Volume*	30-35	L
GW Level (post-purge)	Dry	m bgl	Total Volume Purged**	35L	L
Appearance/Comments	~~Base~~ clear, slightly cloudy, no sheen, no odour				

Sampling Details					
Date / Time / Weather Conditions	26/5/25 12:10pm			Sampled By	MW
Sampling Method / Equipment	Peristaltic pump				
WQM Model	YSI Professional series		WQM Calibration Date		
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)	N/ Interface	
GW Level (pre-micropurge)	4.36	m bgl	Observed Well Depth	10.5	m bgl
Height of Water Column	6.14	m bgl	Estimated Bore Volume*	30.7	L
GW Level (post sample)	5.25	m bgl	Total Volume of Micro-Purged	5-10L	L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
	0	20.6	5.33	18767	6.55	127.0	
	0.5	20.5	2.00	19575	6.62	103.7	
	1.0	20.5	1.10	19788	6.65	97.8	
	1.5	20.5	0.78	19978	6.66	90.9	
	2.0	20.5	0.63	20020	6.67	86.3	
	2.5	20.5	0.54	20037	6.67	85.0	
	3.0	20.5	0.53	20042	6.68	84.3	
	3.5	20.5	0.53	20047	6.68	83.3	
	4.0	20.5	0.53	20040	6.68	82.3	

Notes: # Considered stabilised if three DO values are less than 0.5 mg/L ^ Considered stabilised if three Turbidity values are less than 5 NTU

Sample Details						
Sampling Depth (rationale)		m bgl,	Middle screen			
Sample Observations (e.g. colour, sediment, sheen, odour)	Clear, no turbidity, no odour, no sheen					
Sample ID	BH2					
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

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Geotechnics / Environment / Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location					Project Number	
Well Construction Details	Well ID	BH3	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	28/5/25 12:30pm			Purged By	MW
Purge Method / Equipment	~~Peristaltic pump~~ Bailer				
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	Y	
GW Level (pre-purge)	4.36	m bgl	Observed Well Depth	~~6.67~~	m bgl
Height of Water Column (H)		m bgl	Estimated Bore Volume*		L
GW Level (post-purge)		m bgl	Total Volume Purged**		L
Appearance/Comments					

Sampling Details					
Date / Time / Weather Conditions	26/5/25 12:40pm			Sampled By	MW
Sampling Method / Equipment	Perpump				
WQM Model	YSI Professional series		WQM Calibration Date		
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	N) Interface	
GW Level (pre-micropurge)	4.36	m bgl	Observed Well Depth	6.67	m bgl
Height of Water Column	2.31	m bgl	Estimated Bore Volume*	12-15	L
GW Level (post sample)	5.03	m bgl	Total Volume of Micro-Purged	5-10	L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
	0	20.9	3.26	17089	6.38	61.6	
	0.5	21.0	1.40	17500	6.42	29.7	
	1.0	21.0	1.06	17550	6.43	14.9	
	1.5	21.0	0.60	17594	6.44	-0.8	
	2.0	21.0	0.63	17599	6.44	-8.9	
	2.5	21.0	0.54	17604	6.44	-11.4	
	3.0	21.0	0.54	17602	6.44	-12.6	
	3.5	21.0	0.54	17606	6.44	-14.3	
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)		m bgl,	Middle of screen			
Sample Observations (e.g. colour, sediment, sheen, odour)	Clear, no odour / sheen, no turbidity					
Sample ID	BH3					
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

Douglas Partners
Geotechnics / Environment / Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location					Project Number	
Well Construction Details	Well ID	5	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions	21/5/25			Purged By	NW
Purge Method / Equipment	Twister pump				
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	N/ Interface	
GW Level (pre-purge)	3.00	m bgl	Observed Well Depth	3.5 → 7.7	m bgl
Height of Water Column (H)	0.5m	m bgl	Estimated Bore Volume*	2-5L	L
GW Level (post-purge)	Dry	m bgl	Total Volume Purged**		L
Appearance/Comments	silt buildup from drilling, pumped out to 7.7m bgl → flushed out.				

Sampling Details					
Date / Time / Weather Conditions	26/5/25 11:45am			Sampled By	NW
Sampling Method / Equipment	Perri pump				
WQM Model	YSI Professional plus		WQM Calibration Date		
Product observed / Thickness	NIL	mm	Confirmed with Bailer? (Y / N)	N/ Interface	
GW Level (pre-micropurge)	3.15	m bgl	Observed Well Depth	7.73	m bgl
Height of Water Column	4.58	m bgl	Estimated Bore Volume*	22-25	L
GW Level (post sample)	4.24	m bgl	Total Volume of Micro-Purged	5-10L	L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
	0	20.7	12.69	2316	7.65	124.8	
	0.5	20.6	3.47	2281	2.74	122.8	
	1.0	20.6	2.37	2231	2.74	121.3	
	1.5	20.6	1.98	2164	2.75	119.6	
	2.0	20.6	1.70	2090	2.76	117.9	
	2.5	20.6	1.45	2038	2.73	116.1	
	3.0	20.6	1.30	~~20~~ 1986	2.53	115.0	
	3.5	20.6	1.38	1941	2.54	114.0	
	4.0	20.6	1.38	1929	2.54	114.3	
	4.5	20.6	1.38	1914	2.54	113.1	
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)	7.00	m bgl,	screened section of well			
Sample Observations (e.g. colour, sediment, sheen, odour)	no sheen, no odour, low turbidity					
Sample ID	BH5+BD1 (BH301)					
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	✓	Plastic	✓	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	✓	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	✓
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments						

*Estimated Well Volume = H * F	Std. Drilling Diameter (m)~	NMLC (0.075)	HQ (0.096)	PQ (0.1226)	SFA (0.125)	HFA (0.194)
**Purge Target: min. 3 well volumes	Factor (F):	2.8	3.7	5.2	5.4	11.1

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Soil Vapour Sampling Sheet

Project and Bore Installation Details							
Project Name:	Ramsgate						
Project Number:	C13905.05						
Client							
Sample ID / Bore No.	SV1						
Site Location:							
GPS Co-ord:							
Elevation (RL, m AHD)							
Installation Date:	22/5/25						
Well / Pin Construction Details							
Weather	Humidity 99%		Temperature 17.5		Barometric 1019		
Canister Flow Controller	100 mL/min						
Carbon / TD Tube Flow Controller	100 mL/min	Type	Rotameter, flow ~~flow adaptor and vacuum gauge~~ SKC Pocket Pump				
Pump ID							
Date/Time:	22/5/25 9:30am						
Sampled By:	NW / PW						
Purge Details / Field Readings							
Pre Purge PID Reading	3.7	ppm					
Bulk Gas readings	Time	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)	
	10:50	0.0	0.0	20.3			
	0.5	0.0	0.0	20.3			
	1.0	0.0	0.0	20.3			
	1.5	0.0	0.0	20.4			
	2.0	0.0	0.0	20.3			
Purge Method	LFG metre						
Post Purge PID Reading	0.9	ppm					
Approximate Volume Purged	5L	L					
Pre-Start QA Tests							
Shut In Test							
	Canister			Carbon Tube / TD Setup			
Vacuum Applied	-30	in Hg			kPa		
Duration	5min	min			min		
Pass / Fail	Pass						
Leak Test	PID in Sample Train			PID in Shroud			
	0.3	ppm		200 inside	ppm		
Pass / Fail	pass						
Sampling Details - Primary	2529						
	Canister (canister)			Carbon Tube / TD Tube			
ID Number	SV1 - 2529 (tag) (1709)						
Regulator Number	1745			N/A			
Start Time	11:13	min			min		
Start Vacuum	-27	in Hg			kPa		
Stop Time	11:28	min			min		
Stop Vacuum	-7	in Hg			kPa		
Approximate Sample Volume	670	mL			mL		
	Note: recommended end vacuum of -7 in Hg (~75% full)			Note: recommended < 2.5 kPa induced vacuum (ASTM			
Sampling Details - Replicate	2465						
	Canister 1690 (canister)			Carbon Tube / TD Tube			
ID Number	BD1/20250522 - 2465 (tag)						
Regulator Number	1745			N/A			
Start Time	11:13	min			min		
Start Vacuum	-27	in Hg			kPa		
Stop Time	11:28	min			min		
Stop Vacuum	-7	in Hg			kPa		
Approximate Sample Volume	670	mL			mL		
Sampling Details - Shroud							
Carbon / TD Tube ID	1770402507						
Start Time	11:22	min					
Stop Time	11:23	min					
Sample Time	1min	min					
Approximate Sample Volume	100mL	mL					
Comments / Observations:							

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Soil Vapour Sampling Sheet

Project and Bore Installation Details					
Project Name:	Bankstown				
Project Number:	E13805.05				
Client					
Sample ID / Bore No.	SV2				
Site Location:					
GPS Co-ord:					
Elevation (RL, m AHD)					
Installation Date:	22/5/25				
Well / Pin Construction Details					
Weather	Humidity 89 %		Temperature 12.5		Barometric 1019.4
Canister Flow Controller	100	mL/min			
Carbon / TD Tube Flow Controller	~~150~~	mL/min	Type	Rotameter, flow flow adaptor and vacuum gauge	
Pump ID					
Date/Time:	9:16am 26/5/25				
Sampled By:	NW				

Purge Details / Field Readings						
Pre Purge PID Reading	0.4	ppm				
Bulk Gas readings	Time	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)
	0			20.9	0.0	0
	0.5			20.9	0.0	0
	1.0			20.9	0.0	0
	1.5			20.9	0.0	0
	2.0			20.9	0.0	0
Purge Method	PID6 - Miniraelite LFG metre.					
Post Purge PID Reading	0.3	ppm				
Approximate Volume Purged	5L	L				

Pre-Start QA Tests				
Shut In Test		1681		
	Canister ~~735 NSW~~		Carbon Tube / TD Setup	
Vacuum Applied	-30	in Hg		kPa
Duration	5min	min		min
Pass / Fail	Pass			
Leak Test	PID in Sample Train		PID in Shroud	
	0.3	ppm	1.9	ppm
Pass / Fail	PASS			

Sampling Details - Primary		1681		
	Canister ~~735 NSW~~		Carbon Tube / TD Tube	
ID Number	1618			
Regulator Number	1976		N/A	
Start Time	9:55	min		min
Start Vacuum	-7	in Hg		kPa
Stop Time	10:03	min		min
Stop Vacuum	-7	in Hg		kPa
Approximate Sample Volume	670	mL		mL
	Note: recommended end vacuum of -7 in Hg (~75% full)		Note: recommended < 2.5 kPa induced vacuum (ASTM	

Sampling Details - Replicate				
	Canister		Carbon Tube / TD Tube	
ID Number				
Regulator Number			N/A	
Start Time		min		min
Start Vacuum		in Hg		kPa
Stop Time		min		min
Stop Vacuum		in Hg		kPa
Approximate Sample Volume		mL		mL

Sampling Details - Shroud		
Carbon / TD Tube ID		
Start Time		min
Stop Time		min
Sample Time		min
Approximate Sample Volume		mL

Comments / Observations:	

Douglas PARTNERS

Soil Vapour Sampling Sheet

Project and Bore Installation Details							
Project Name:	Bamstown						
Project Number:	213805.05						
Client							
Sample ID / Bore No.	SV3						
Site Location:							
GPS Co-ord:							
Elevation (RL, m AHD)							
Installation Date:	22/5/25						
Well / Pin Construction Details							
Weather	Humidity 67		Temperature 15.0		Barometric 1019.1		
Canister Flow Controller	100 mL/min						
Carbon / TD Tube Flow Controller	mL/min		Type	Rotameter, flow flow adaptor and vacuum gauge			
Pump ID							
Date/Time:	26/5/25	10:22am					
Sampled By:	WW						
Purge Details / Field Readings							
Pre Purge PID Reading	0.0	ppm					
Bulk Gas readings	Time	Concentration (% v/v) CH_4	CO_2	O_2	H_2S (ppm)	CO (ppm)	
	10:24 - 0			20.9	0.0	0	
	0.5			20.9	0.0	0	
	1.0			20.9	0.0	0	
	1.5			20.7	0.0	0	
	2.0			20.9	0.0	0	
Purge Method	Minirae lite LFG metre						
Post Purge PID Reading		ppm					
Approximate Volume Purged	5L	L					
Pre-Start QA Tests							
Shut In Test							
	852 Canister			Carbon Tube / TD Setup			
Vacuum Applied	-30	in Hg			kPa		
Duration	5min	min			min		
Pass / Fail	PASS						
Leak Test	PID in Sample Train			PID in Shroud			
	0.0	ppm		183.6	ppm		
Pass / Fail	PASS						
Sampling Details - Primary							
	852 Canister			Carbon Tube / TD Tube			
ID Number	852						
Regulator Number	~~10:45~~ 1767			N/A			
Start Time	~~10:45~~ 10:45	min			min		
Start Vacuum	-28	in Hg			kPa		
Stop Time	10:56	min			min		
Stop Vacuum	-7	in Hg			kPa		
Approximate Sample Volume		mL			mL		
	Note: recommended end vacuum of -7 in Hg (~75% full)			Note: recommended < 2.5 kPa induced vacuum (ASTM			
Sampling Details - Replicate							
	Canister			Carbon Tube / TD Tube			
ID Number							
Regulator Number				N/A			
Start Time		min			min		
Start Vacuum		in Hg			kPa		
Stop Time		min			min		
Stop Vacuum		in Hg			kPa		
Approximate Sample Volume		mL			mL		
Sampling Details - Shroud							
Carbon / TD Tube ID	177040855 9						
Start Time	10:55	min					
Stop Time	10:56	min					
Sample Time	1 min	min					
Approximate Sample Volume		mL					
Comments / Observations:							

Appendix F

Laboratory Documentation

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CERTIFICATE OF ANALYSIS 381643

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel Hall
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**213805.05 Bankstown**
Number of Samples	6 Air
Date samples received	26/05/2025
Date completed instructions received	27/05/2025

Analysis Details

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

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

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

Report Details

Date results requested by	03/06/2025
Date of Issue	03/06/2025

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Results Approved By
Jue Wang, Chemist (FAS)
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

TO15 Chlorinated in Cans ppbv					
Our Reference		381643-1	381643-2	381643-3	381643-4
Your Reference	UNITS	SV1	SV2	SV3	BD1/20250522
Date Sampled		22/05/2025	26/05/2025	26/05/2025	22/05/2026
Type of sample		Air	Air	Air	Air
Air Kit Security No.		2529	2456	1877	2465
Vacuum before Shipment	Hg"	-30	-30	-30	-30
Vacuum before Analysis	Hg"	-6	-5	-6	-5
Date prepared	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Vinyl chloride	ppbv	<0.3	<0.3	<0.3	<0.3
1,1-Dichloroethene	ppbv	<0.5	<0.5	<0.5	<0.5
trans-1,2-dichloroethene	ppbv	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	ppbv	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	ppbv	<0.5	<0.5	<0.5	<0.5
Trichloroethene	ppbv	<0.3	<0.3	<0.3	0.4
Tetrachloroethene	ppbv	<0.5	<0.5	<0.5	<0.5
Isopropyl Alcohol	ppbv	8	7	<5	9
Benzene	ppbv	<0.5	<0.5	<0.5	<0.5
Toluene	ppbv	0.5	<0.5	<0.5	0.5
Ethylbenzene	ppbv	<0.5	<0.5	<0.5	<0.5
m-& p-Xylene	ppbv	<1	<1	<1	<1
o-Xylene	ppbv	<0.5	<0.5	<0.5	<0.5
Naphthalene	ppbv	<0.5	<0.5	<0.5	<0.5
Surrogate-Bromochloromethane	% rec	112	112	104	107
Surrogate -1,4-Difluorobenzene	% rec	99	97	94	93
Surrogate-Chlorobenzene-D5	% rec	97	96	90	92

TO15 chlorinated VOCs in Cans µg/m3					
Our Reference		381643-1	381643-2	381643-3	381643-4
Your Reference	UNITS	SV1	SV2	SV3	BD1/20250522
Date Sampled		22/05/2025	26/05/2025	26/05/2025	22/05/2026
Type of sample		Air	Air	Air	Air
Air Kit Security No.		2529	2456	1877	2465
Vacuum before Shipment	Hg"	-30	-30	-30	-30
Vacuum before Analysis	Hg"	-6	-5	-6	-5
Date prepared	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Vinyl chloride	µg/m^3	<0.8	<0.8	<0.8	<0.8
1,1-Dichloroethene	µg/m^3	<2	<2	<2	<2
trans-1,2-dichloroethene	µg/m^3	<2	<2	<2	<2
cis-1,2-Dichloroethene	µg/m^3	<2	<2	<2	<2
1,1,1-Trichloroethane	µg/m^3	<2.7	<2.7	<2.7	<2.7
Trichloroethene	µg/m^3	<1.6	<1.6	<1.6	2
Tetrachloroethene	µg/m^3	<3.4	<3.4	<3.4	<3.4
Isopropyl Alcohol	µg/m^3	20	20	<12	20
Benzene	µg/m^3	<1.6	<1.6	<1.6	<1.6
Toluene	µg/m^3	2	<1.9	<1.9	2
Ethylbenzene	µg/m^3	<2.2	<2.2	<2.2	<2.2
m-& p-Xylene	µg/m^3	<4.3	<4.3	<4.3	<4.3
o-Xylene	µg/m^3	<2.2	<2.2	<2.2	<2.2
Naphthalene	µg/m^3	<2.6	<2.6	<2.6	<2.6
Surrogate-Bromochloromethane	% rec	112	112	104	107
Surrogate -1,4-Difluorobenzene	% rec	99	97	94	93
Surrogate-Chlorobenzene-D5	% rec	97	96	90	92

TPH Air/ Air Phase Hydrocarbon				
Our Reference		381643-1	381643-2	381643-3
Your Reference	UNITS	SV1	SV2	SV3
Date Sampled		22/05/2025	26/05/2025	26/05/2025
Type of sample		Air	Air	Air
Air Kit Security No.		2529	2456	1877
Date prepared	-	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	28/05/2025	28/05/2025	28/05/2025
TPH C_5 - C_8 Aliphatic	µg/m^3	<200	<200	<200
TPH C_9 - C_{12} Aliphatic	µg/m^3	<50	<50	<50
TPH C_9 - C_{10} Aromatic	µg/m^3	<100	<100	<100
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	<200	<200	<200
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	<40	<40	<40

IPA in Carbon Tubes & Badges*		
Our Reference		381643-5
Your Reference	UNITS	Shroud1
Date Sampled		22/05/2025
Type of sample		Air
Air Kit Security No.		170408507
Date Extracted	-	29/05/2025
Date Analysed	-	30/05/2025
Tube Sampling rate	mL/min	100
Sampling Time	mins	1
Volume sampled	m^3	0.00010
Isopropyl Alcohol*	µg	40
Isopropyl Alcohol*	µg/m^3	350,000
Surrogate Toluene-d8	%	98
Surrogate 4-Bromofluorobenzene	%	86

Method ID	Methodology Summary
AT-005	Measurement of Air-Phase Petroleum Hydrocarbons and Ozone Precursors by GC-MS.
ORG-022	Determination of volatile organic compounds in charcoal tubes/badges/sorbents using CS2 extraction, determined by GC/GC-MS. Desorption efficiencies are not applied to results. Note where µg/m3 or mg/m3 results are supplied for SKC badges, the factors used are for 575-002, if 575-002 data is unavailable for an analyte then use 575-001 then 575-003 (exposure time must be supplied). Otherwise a sampling rate may be used for a similar analyte on request. Analytes such as (where applicable) Iodomethane, Chloroprene, Nitrobenzene, Naphthalene and 1, 2, 3 / 1, 2, 4 Trichlorobenzenes are considered to be semi-quant analyses using CS2 desorption from charcoal tubes. The latter three compounds are better served by XAD-2 collection and analysis.
TO15	USEPA TO15 - Analysis of VOC's in air using USEPA TO15 and in house method AT-002. Note, longer term stability of some oxygenated compounds is questionable where significant humidity is present.

QUALITY CONTROL: TO15 Chlorinated in Cans ppbv					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Vacuum before Shipment	Hg"			[NT]	1	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-6	-6	0	[NT]	[NT]
Date prepared	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
Date analysed	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
Vinyl chloride	ppbv	0.3	TO15	<0.3	1	<0.3	<0.3	0	[NT]	[NT]
1,1-Dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
trans-1,2-dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
cis-1,2-Dichloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
1,1,1-Trichloroethane	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Trichloroethene	ppbv	0.3	TO15	<0.3	1	<0.3	<0.3	0	[NT]	[NT]
Tetrachloroethene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Isopropyl Alcohol	ppbv	5	TO15	<5	1	8	7	13	[NT]	[NT]
Benzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	101	[NT]
Toluene	ppbv	0.5	TO15	<0.5	1	0.5	0.5	0	104	[NT]
Ethylbenzene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	101	[NT]
m-& p-Xylene	ppbv	1	TO15	<1	1	<1	<1	0	101	[NT]
o-Xylene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	101	[NT]
Naphthalene	ppbv	0.5	TO15	<0.5	1	<0.5	<0.5	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	98	1	112	112	0	99	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	89	1	99	99	0	97	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	88	1	97	98	1	99	[NT]

QUALITY CONTROL: TO15 chlorinated VOCs in Cans µg/m3					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Vacuum before Shipment	Hg"			[NT]	1	-30	-30	0	[NT]	[NT]
Vacuum before Analysis	Hg"			[NT]	1	-6	-6	0	[NT]	[NT]
Date prepared	-			28/05/2025	1	28/05/2025	28/05/2025		[NT]	[NT]
Date analysed	-			28/05/2025	1	28/05/2025	28/05/2025		[NT]	[NT]
Vinyl chloride	µg/m^3	0.8	TO15	<0.8	1	<0.8	<0.8	0	[NT]	[NT]
1,1-Dichloroethene	µg/m^3	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
trans-1,2-dichloroethene	µg/m^3	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
cis-1,2-Dichloroethene	µg/m^3	2.0	TO15	<2.0	1	<2	<2	0	[NT]	[NT]
1,1,1-Trichloroethane	µg/m^3	2.7	TO15	<2.7	1	<2.7	<2.7	0	[NT]	[NT]
Trichloroethene	µg/m^3	1.6	TO15	<1.6	1	<1.6	<1.6	0	[NT]	[NT]
Tetrachloroethene	µg/m^3	3.4	TO15	<3.4	1	<3.4	<3.4	0	[NT]	[NT]
Isopropyl Alcohol	µg/m^3	12	TO15	<12	1	20	20	0	[NT]	[NT]
Benzene	µg/m^3	1.6	TO15	<1.6	1	<1.6	<1.6	0	[NT]	[NT]
Toluene	µg/m^3	1.9	TO15	<1.9	1	2	2	0	[NT]	[NT]
Ethylbenzene	µg/m^3	2.2	TO15	<2.2	1	<2.2	<2.2	0	[NT]	[NT]
m-& p-Xylene	µg/m^3	4.3	TO15	<4.3	1	<4.3	<4.3	0	[NT]	[NT]
o-Xylene	µg/m^3	2.2	TO15	<2.2	1	<2.2	<2.2	0	[NT]	[NT]
Naphthalene	µg/m^3	2.6	TO15	<2.6	1	<2.6	<2.6	0	[NT]	[NT]
Surrogate-Bromochloromethane	% rec		TO15	98	1	112	112	0	[NT]	[NT]
Surrogate -1,4-Difluorobenzene	% rec		TO15	89	1	99	99	0	[NT]	[NT]
Surrogate-Chlorobenzene-D5	% rec		TO15	88	1	97	98	1	[NT]	[NT]

QUALITY CONTROL: TPH Air/ Air Phase Hydrocarbon						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
Date analysed	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
TPH C_5 - C_8 Aliphatic	µg/m^3	200	AT-005	<200	1	<200	<200	0	92	[NT]
TPH C_9 - C_{12} Aliphatic	µg/m^3	50	AT-005	<50	1	<50	<50	0	[NT]	[NT]
TPH C_9 - C_{10} Aromatic	µg/m^3	100	AT-005	<100	1	<100	<100	0	92	[NT]
TPH C_6 - C_{10} - BTEX (F1)	µg/m^3	200	TO15	<200	1	<200	<200	0	95	[NT]
TPH >C_{10} - C_{12} - Naphthalene (F2)	µg/m^3	40	TO15	<40	1	<40	<40	0	94	[NT]

QUALITY CONTROL: IPA in Carbon Tubes & Badges*					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date Extracted	-			29/05/2025	[NT]	[NT]	[NT]	[NT]	29/05/2025	[NT]
Date Analysed	-			30/05/2025	[NT]	[NT]	[NT]	[NT]	30/05/2025	[NT]
Isopropyl Alcohol*	µg	5	ORG-022	<5	[NT]	[NT]	[NT]	[NT]	76	[NT]
Surrogate Toluene-d8	%		ORG-022	104	[NT]	[NT]	[NT]	[NT]	96	[NT]
Surrogate 4-Bromofluorobenzene	%		ORG-022	103	[NT]	[NT]	[NT]	[NT]	99	[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.

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	213805.05	**Suburb:** Bankstown	**To:** Envirolab Services
Project Name:	Bankstown Compass Centre	**Order Number**	12 Ashley Street Chatswood
Project Manager:	Joel James-Hall	**Sampler:** NW/ZW	**Attn:**
Emails:	joel.james-hall@douglaspartners.com.au; nathan.woodward@douglaspartners.com.au		**Phone:**
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard X		**Email:**
Prior Storage:	☐ Esky ☐ Fridge ☐ Shelved	Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

Sample ID	Lab ID	Date & Time Sampled	Sample Type (S - suma canister C - Carbon tube)	Serial No.s: Canister / Tube ID	Serial No.s: Regulator ID	Analytes: Airphase TRH	Analytes: BTEXN, IPA, Chlorinated VOC	Analytes: IPA	Analytes:	Analytes:	Sample Details: Start Vacuum	Sample Details: Stop Vacuum	Sample Details: Sample Duration (minutes)	Sample Details: Flow Rate (mL/min)	Sample Details: Volume (mL)	Sample Details: PID	Comments / Weather
SV1	1	22/05/25	S	1709 2529	1745	X	X				-27	-7	15	100	670	0.9	
SV2	2	26/05/25	S	1681 2456	1976	X	X				-28	-7	8	100	680	0.3	
SV3	3	26/05/25	S	852 1877	1767	X	X				-28	-7	11	100	680	0	
BD1/20250522	4	22/05/25	S	1690 2465	1745		X				-27	-7	15	100	670	0.9	
Shroud 1	5	22/05/25	C	1770408507	-			X			-	-	1	100	100	200	
Shroud 2	6	26/05/25	C	1770408509	-						-	-	1	100	100	183	
PQL (S) mg/kg																**ANZECC PQLs req'd for all water analytes** ☐	

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: **Relinquished by:** NW **Transported to laboratory by: NW**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: **Received by:** **Date & Time:**

ENVIROLAB GROUP

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

Job No: 381643

Date Received: 27/5/25
Time Received: 10:00
Received By: DF
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

* Samples rec'd 26/5/25 @ 17:30

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	Joel Hall

Sample Login Details

Your reference	213805.05 Bankstown
Envirolab Reference	381643
Date Sample Received	26/05/2025
Date Instructions Received	27/05/2025
Date Results Expected to be Reported	03/06/2025

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Air
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	n/a
Cooling Method	Not applicable
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	TO15 Chlorinated in Cans ppbv	TO15 chlorinated VOCs in Cans µg/m3	TPH Air/ Air Phase Hydrocarbon	IPA in Carbon Tubes & Badges*	On Hold
SV1	✓	✓	✓		
SV2	✓	✓	✓		
SV3	✓	✓	✓		
BD1/20250522	✓	✓			
Shroud1				✓	
Shroud2					✓

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

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.

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customerservice@envirolab.com.au
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CERTIFICATE OF ANALYSIS 381709

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel Hall
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**213805.05 Bankstown**
Number of Samples	6 Water
Date samples received	27/05/2025
Date completed instructions received	27/05/2025

Analysis Details

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

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

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

Report Details

Date results requested by	03/06/2025
Date of Issue	29/05/2025

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Jack Wallis, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

VOCs in water				
Our Reference		381709-1	381709-2	381709-3
Your Reference	UNITS	BH2	BH3	BH5
Date Sampled		26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water
Date Extracted	-	27/05/2025	27/05/2025	27/05/2025
Date Analysed	-	28/05/2025	28/05/2025	28/05/2025
Dichlorodifluoromethane	µg/L	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1
Chloroform	µg/L	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1
Benzene	µg/L	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1

VOCs in water				
Our Reference	UNITS	381709-1	381709-2	381709-3
Your Reference		BH2	BH3	BH5
Date Sampled		26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water
Bromoform	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
Styrene	µg/L	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1
o-xylene	µg/L	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1
Isopropylbenzene	µg/L	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	104	104	104
Surrogate Toluene-d8	%	100	97	98
Surrogate 4-Bromofluorobenzene	%	95	93	94

vTRH(C6-C10)/BTEXN in Water						
Our Reference		381709-1	381709-2	381709-3	381709-4	381709-5
Your Reference	UNITS	BH2	BH3	BH5	BD1/20250526	Trip Spike
Date Sampled		26/05/2025	26/05/2025	26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	27/05/2025	27/05/2025	27/05/2025	27/05/2025	27/05/2025
Date analysed	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025	28/05/2025
TRH C_6 - C_9	µg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	<10	<10	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	<1	113%
Toluene	µg/L	<1	<1	<1	<1	107%
Ethylbenzene	µg/L	<1	<1	<1	<1	104%
m+p-xylene	µg/L	<2	<2	<2	<2	101%
o-xylene	µg/L	<1	<1	<1	<1	105%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	104	104	104	104	103
Surrogate Toluene-d8	%	100	97	98	97	99
Surrogate 4-Bromofluorobenzene	%	95	93	94	94	95

vTRH(C6-C10)/BTEXN in Water		
Our Reference		381709-6
Your Reference	UNITS	Trip Blank
Date Sampled		26/05/2025
Type of sample		Water
Date extracted	-	27/05/2025
Date analysed	-	28/05/2025
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	103
Surrogate Toluene-d8	%	99
Surrogate 4-Bromofluorobenzene	%	94

svTRH (C10-C40) in Water					
Our Reference		381709-1	381709-2	381709-3	381709-4
Your Reference	UNITS	BH2	BH3	BH5	BD1/20250526
Date Sampled		26/05/2025	26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	29/05/2025	29/05/2025	29/05/2025	29/05/2025
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	<50	<50
Surrogate o-Terphenyl	%	113	109	108	110

PAHs in Water					
Our Reference		381709-1	381709-2	381709-3	381709-4
Your Reference	UNITS	BH2	BH3	BH5	BD1/20250526
Date Sampled		26/05/2025	26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	29/05/2025	29/05/2025	29/05/2025	29/05/2025
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	%	113	114	107	111

HM in water - dissolved					
Our Reference	UNITS	381709-1	381709-2	381709-3	381709-4
Your Reference		BH2	BH3	BH5	BD1/20250526
Date Sampled		26/05/2025	26/05/2025	26/05/2025	26/05/2025
Type of sample		Water	Water	Water	Water
Date prepared	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Date analysed	-	28/05/2025	28/05/2025	28/05/2025	28/05/2025
Arsenic-Dissolved	µg/L	2	<1	6	6
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	5	5
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	2	2	3	3
Zinc-Dissolved	µg/L	7	2	<1	<1

Method ID	Methodology Summary
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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.

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date Extracted	-			27/05/2025	1	27/05/2025	28/05/2025		27/05/2025	[NT]
Date Analysed	-			28/05/2025	1	28/05/2025	29/05/2025		28/05/2025	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	83	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	1	<1	<1	0	89	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	90	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	83	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
Dibromomethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	84	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	83	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	80	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	86	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	86	[NT]
Bromoform	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	86	[NT]
Styrene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	88	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	102	1	104	106	2	102	[NT]
Surrogate Toluene-d8	%		Org-023	97	1	100	97	3	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	93	1	95	94	1	99	[NT]

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	-			27/05/2025	1	27/05/2025	28/05/2025		27/05/2025	[NT]
Date analysed	-			28/05/2025	1	28/05/2025	29/05/2025		28/05/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	86	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	86	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	87	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	86	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	86	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	88	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	102	1	104	106	2	102	[NT]
Surrogate Toluene-d8	%		Org-023	97	1	100	97	3	99	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	93	1	95	94	1	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	381709-2
Date extracted	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	28/05/2025
Date analysed	-			28/05/2025	1	29/05/2025	29/05/2025		28/05/2025	29/05/2025
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	95	113
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	96	110
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	86	117
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	95	113
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	96	110
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	86	117
Surrogate o-Terphenyl	%		Org-020	99	1	113	111	2	110	92

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	381709-2
Date extracted	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	28/05/2025
Date analysed	-			29/05/2025	1	29/05/2025	29/05/2025		29/05/2025	29/05/2025
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	113	112
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	99	98
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	103	89
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	105	93
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	94	90
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	101
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	85
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	86	91
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	112	1	113	110	3	110	110

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
Date analysed	-			28/05/2025	1	28/05/2025	28/05/2025		28/05/2025	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	95	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	95	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	98	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		84	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	95	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	7	7	0	94	[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.

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

CoC: 27/05/2025 1024

Douglas PARTNERS | GROUNDED EXPERTISE

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	213805.05	**Suburb:**	Bankstown	**To:**	Envirolab Services
Project Manager:	Joel James-Hall	**Order Number:**		**Sampler:** NW	12 Ashley St, Chatswood NSW 2067
Email:	joel.james-hall@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 3 (dissolved)	VOC	BTEX								Notes/ Preservation/ Additional Requirements
1	BH2	-	-	26/05/25	W	G,P	X	X									low level PAH
2	BH3	-	-	26/05/25	W	G,P	X	X									low level PAH
3	BH5	-	-	26/05/25	W	G,P	X	X									low level PAH
4	BD1/20250526	-	-	26/05/25	W	G,P	X										
5	Trip spike	-	-	26/05/25	W	G			X								
6	Trip blank	-	-	26/05/25	W	G			X								

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

Job No: 381709

Date Received: 26/05/25
Time Received: 1735
Received By: TTY
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:			
Number of samples in container:		**Transported to laboratory by:**	Douglas Partners
Send results to:	Douglas Partners Pty Ltd		
Address:	96 Hermitage Road, West Ryde NSW 211	**Phone:**	(02) 9809 0666
Relinquished by:	Nathan Woodward	**Date:**	26/05/2025
		Signed:	

LAB RECEIPT

Lab Ref. No:	
Received by:	Tony Trinh
Date & Tim	26/05/25 1735
Signed:	TTY

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	Joel Hall

Sample Login Details

Your reference	213805.05 Bankstown
Envirolab Reference	381709
Date Sample Received	27/05/2025
Date Instructions Received	27/05/2025
Date Results Expected to be Reported	03/06/2025

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
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	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	HM in water - dissolved
BH2	✓	✓	✓	✓	✓
BH3	✓	✓	✓	✓	✓
BH5	✓	✓	✓	✓	✓
BD1/20250526		✓	✓	✓	✓
Trip Spike		✓			
Trip Blank		✓			

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

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.

Appendix G

Data QA/QC

1. Field and laboratory data quality assurance and quality control

The field and laboratory data quality assurance and quality control (QA/QC) procedures and results are summarised in the following Table 1. Reference should be made to the field work methodology and the laboratory results / certificates of analysis for further details. The relative percentage difference (RPD) results, along with the other field QC samples are included at the end of this appendix.

Table 1: Field and laboratory quality control

Item	Evaluation / acceptance criteria	Compliance
Analytical laboratories used	NATA accreditation	C
Holding times	Various based on type of analysis	C
Intra-laboratory replicates	10% of primary samples; <30% RPD	C
Trip spikes	1 per sampling event; 60-140% recovery	C
Trip blanks	1 per sampling event; <PQL	C
Laboratory / reagent blanks	1 per batch; <PQL	C
Laboratory duplicate	1 per lab batch; as laboratory certificate	C
Matrix spikes	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Surrogate spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Control samples	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Standard operating procedures (SOP)	Adopting SOP for all aspects of the sampling field work	C

Notes:
C = compliance; PC = partial compliance; NC = non-compliance

In summary, the QC data is determined to be of sufficient quality to be considered acceptable for the assessment.

2. Data quality indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQI) as outlined in NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013):

- Completeness: a measure of the amount of usable data from a data collection activity;

- Comparability: the confidence (qualitative) that data may be considered to be equivalent for each sampling and analytical event;
- Representativeness: the confidence (qualitative) of data representativeness of media present on-site;
- Precision: a measure of variability or reproducibility of data; and
- Accuracy: a measure of closeness of the data to the 'true' value.

The results of the assessment are summarised in Table 2.

Table 2: Data quality indicators

Data quality indicator	Method(s) of achievement
Completeness	Systematic and selected target locations sampled.
	Preparation of borehole logs, sample location plan and chain of custody records.
	Preparation of field sampling sheets.
	Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody.
	Samples analysed for contaminants of potential concern (CoPC) identified in the conceptual site model (CSM).
	Completion of chain of custody documentation.
	NATA accredited laboratory results certificates provided by the laboratory.
	Satisfactory frequency and results for field and laboratory quality control (QC) samples as discussed in Section 1.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project.
	Experienced sampler(s) used.
	Use of NATA registered laboratories, with test methods the same or similar between laboratories.
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled.
	Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQO.
	Samples were extracted and analysed within holding times.
	Samples were analysed in accordance with the chain of custody.
Precision	Field staff followed standard operating procedures.
	Acceptable RPD between original samples and replicates.
	Satisfactory results for all other field and laboratory QC samples.

Data quality indicator	Method(s) of achievement
Accuracy	Field staff followed standard operating procedures.
	Satisfactory results for all field and laboratory QC samples.

Based on the above, it is considered that the DQI have generally been complied with.

3. Conclusion

Based on the results of the field QA and field and laboratory QC, and evaluation against the DQI it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

4. References

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

Groundwater Replicate

Lab	Sample ID	Date Sampled	Units	Metals										TRH				BTEX			
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Benzo(a)pyrene	Total PAH	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-34)	F4 (>C34-40)	Benzene	Toluene	Ethylbenzene	Total Xylenes
ELS	BH5 (301)	26/05/2025	µg/L	6	<0.1	<1	5	<1	<0.05	3	<1	<0.1	<0.1	<10	<50	<100	<100	<1	<1	<1	<3
ELS	BD1/20250526	26/05/2025	µg/L	6	<0.1	<1	5	<1	<0.05	3	<1	<0.1	<0.1	<10	<50	<100	<100	<1	<1	<1	<3
Difference			µg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD			%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Soil Vapour Replicate

Lab	Sample ID	Date Sampled	Units	VOC												
				Isopropyl Alcohol	Vinyl chloride	Trichloroethene	1,1-Dichloroethene	trans-1,2-dichloroethene	cis-1,2-Dichloroethene	Tetrachloroethene	Benzene	Toluene	Ethylbenzene	m-& p-Xylene	o-Xylene	Naphthalene
ELS	SV1	22/05/2025	µg/m3	**20**	**<0.8**	**<1.6**	**<2**	**<2**	**<2**	**<3.4**	**<1.6**	**2**	**<2.2**	**<4.3**	**<2.2**	**<2.6**
ELS	BD1/20250522	22/05/2025	µg/m3	**20**	**<0.8**	**2**	**<2**	**<2**	**<2**	**<3.4**	**<1.6**	**2**	**<2.2**	**<4.3**	**<2.2**	**<2.6**
Difference			µg/m3	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD			%	0.0	0.0	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Trip Spike and Blank Samples

Lab	Sample ID	Date Sampled	Units	BTEX				
				Benzene	Toluene	Ethylbenzene	m+p Xylenes	o Xylenes
ELS	Trip Spike	45799	µg/m3	**113%**	**107%**	**104%**	**101%**	**105%**
ELS	Trip Blank	45799	µg/m3	<1	<1	<1	<2	<1