

Attachment A16

Dewatering Management Plan

Report on Dewatering Management Plan

Proposed Mixed Use Development

41-49 Mountain Street, Ultimo NSW

**Prepared for Evolution MIT Services Pty
Ltd as trustee for Apt Hold Trust 2**

Project 231957.02

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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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Report on Dewatering Management Plan Proposed Mixed Use Development 41-49 Mountain Street, Ultimo NSW

1. Introduction

This Dewatering Management Plan (DMP) has been prepared by Douglas Partners Pty Ltd (Douglas) for a proposed mixed use development at 41-49 Mountain Street, Ultimo NSW (the site). The DMP was commissioned by email instructing to proceed by Juey Thanyakittikul of Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2 and was undertaken in accordance with Douglas' proposal 231957.02.P.001.Rev1 dated 29 November 2024.

This DMP is required to accompany the Development Application (DA) to City of Sydney Council (the council) and will also be used as the basis for dewatering approval from WaterNSW and City of Sydney Council (Council). Details of the field work and numerical modelling are given in this report.

Based on project documentation provided by the client, it is understood that the proposed development includes construction of a ten to eleven storey mixed-use building with a single level basement for off-street carparking. The basement finished floor level is understood to be RL2.6 m AHD. The façade of a heritage-listed substation building in the northeast corner of the site will be retained, while the internal space of the building will be refurbished for retail use.

This DMP is based on the field work results of a geotechnical and hydrogeological investigation undertaken at the site in February 2025 (refer to Douglas' report 231957.02.R.001.Rev0 dated 25 March 2025). An overview of the results of the investigation is presented in this report.

It should be noted that a site dewatering plan (SDP) is required to be submitted with the application for a Construction Certificate. This SDP should be prepared by the civil engineer or contractor managing dewatering on site and would be based on the inflow results and recommendations outlined in this DMP.

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

2. Site description

The site is located at 41 to 49 Mountain Street, Ultimo within City of Sydney local government area (LGA). The site is bounded by Smail Street to the north, Mountain Street to the east and multi-storey commercial / retail properties to the south and the west. The site is rectangular in shape and covers an area of about 1,460 m².

The general topography across the site slopes gently downwards to the northeast as part of the regional topography sloping generally northwards to Blackwattle Bay, approximately 1.1 km to the northwest of the site. Site levels range from about RL 8 m AHD in the southwest corner to

RL 6 m AHD at the northeast boundary. The site boundary and topographic contour levels obtained from NSW government mapping service are shown in Figure 1.

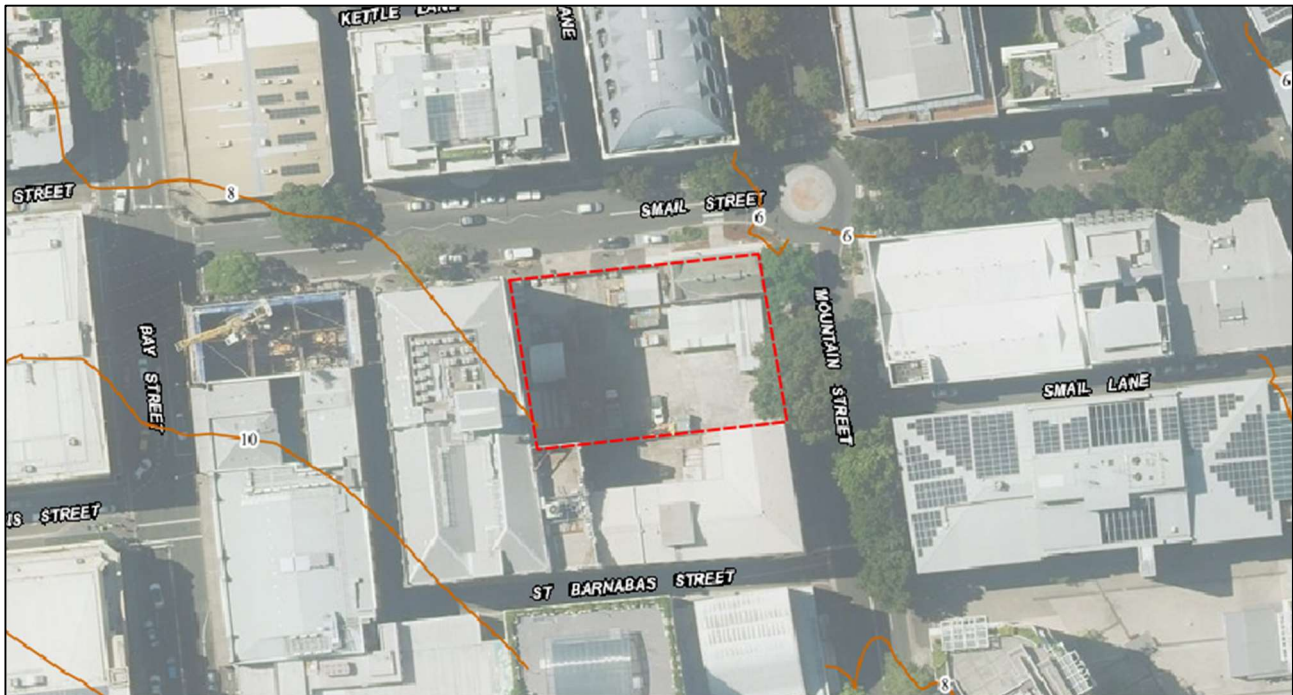


Figure 1: Site location (highlighted with red boundary) with topographic contours

3. Published data

3.1 Geology

The Sydney 1:100,000 Geological Series Sheet indicates that the site is underlain by man-made fill overlying alluvial and estuarine sediment of the Quaternary period.

The NSW Seamless Geology Map indicates that the site, except for the southwest portion, is underlain by anthropogenic deposits (Q_h), which include a mix of large man-made clasts (ranging from concrete blocks to building demolition rubble) and quarried natural boulders, with an interstitial sand sized to clay matrix. The southwest corner of the site is underlain by Hawkesbury Sandstone (Tuth), which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.2 Hydrogeology

A groundwater bore search of the WaterNSW database was conducted for bores registered within a 500 m radius of the site to assess potential water levels and groundwater usage in the area. The search identified thirteen registered monitoring bores to the southeast of the site, with standing water level records available for six bores from 2007 and 2008. The recorded standing water levels ranged from 2.1 m to 5.9 m below ground level.

3.3 Groundwater dependant ecosystems (GDEs)

A review of Bureau of Methodology Groundwater Dependiant Ecosystems Atlas indicates that there are no aquatic, subterranean or terrestrial GDEs within 1 km of the site.

4. Field work

4.1 Geotechnical investigation

A geotechnical investigation was undertaken by Douglas in February 2025. Boreholes were drilled to depths ranging between 8.7 m to 10.2 m. Based on the investigation, the site is generally underlain by pavement and fill over sandy alluvial soils then sandstone bedrock. The location of the geotechnical boreholes is shown on Drawing 1 in Appendix B together with the boreholes drilled as part of the concurrent contamination site investigation.

The observed subsurface profile during the investigation has been grouped into five geotechnical units (1 to 5). The rock units were classified in accordance with Pells et al *"Classification of Sandstone and Shale in the Sydney Region: A Forty Year Review"* (AGS Journal, June 2019), which uses a combination of rock strength and fracture spacing (and thickness) to divide the rock into five classes ranging from Class I (high strength and very few defects) to Class V (extremely low to very low strength and/or highly fractured). The interpreted depth and Reduced Level (RL) at the top of the rock classes are shown in Table 1.

Table 1: Summary of geotechnical model

Unit	Unit Description	Depth to Top of Unit ⁽¹⁾ (m) [Reduced Level of Top of Unit (m AHD)]			
		BH101	BH102	BH103	BH101 (1-3 Smail St)
1	Concrete Pavement and Fill	0.0 [6.6]	0.0 [6.8]	0.0 [6.5]	0.0 [7.8]
2a	Alluvial - Very Loose to Loose Sand	1.2 [5.4]	1.0 [5.8]	N.E ⁽²⁾	N.E
2b	Alluvial - Medium Dense to Dense Sand	2.0 [4.6]	2.0 [4.8]	1.5 [5.0]	N.E
3	Class V Sandstone	2.4 [4.2]	3.6 [3.2]	N.E	N.E
4	Class IV Sandstone	2.6 [4.0]	4.5 [2.3]	2.5 [4.0]	1.3 [6.5]
5	Class III Sandstone	8.5 [-1.9]	9.9 [-3.1]	3.0 [3.5]	2.3 [5.5]
Termination Depth		10.2 [-3.6]	10.1 [-3.3]	8.7 [-2.2]	3.8 [4.0]

Note: ⁽¹⁾ Below current ground surface level
⁽²⁾ N.E = Not Encountered
⁽³⁾ Rock classification is based on Pells et al., 2019.

4.2 Groundwater investigation

Three groundwater monitoring wells were installed as part of the groundwater investigation, summarised in Table 2. The locations of the groundwater monitoring wells are shown on Drawing 1 in Appendix B. Reference should be made to the borehole logs in Appendix C for more detailed information and description for the soil and rock profile.

Table 2: Monitoring wells overview

Location ID	Surface RL (m AHD)	Screen Depth (m bgl*)	Screened Lithology
BH101	6.6	2.0 – 10.2	Silty sand from 2.0 m to 2.4 m, then extremely to moderately weathered low strength sandstone, becoming to slightly weathered medium strength sandstone.
BH102	6.8	2.0 – 10.1	Sand from 2.0 m to 2.5 m, then extremely to highly weathered very low to low strength sandstone, becoming slightly weathered medium strength sandstone.
BH103	6.5	2.0 – 5.0	Sand from 2.0 m to 2.5 m, then moderately to slightly weathered medium to high strength sandstone.

Notes: *bgl: below ground level

4.2.1 Groundwater levels

A summary of the measured groundwater levels within the site is provided in Table 3.

Data loggers have been installed in each of the monitoring wells for continuous groundwater level monitoring over a three-month period. Table 4 presents the minimum, maximum and average of the recorded levels during this monitoring period. Hydrographs showing the recorded groundwater levels are attached in Appendix D.

Table 3: Summary of manual groundwater measurements

Date of Reading	Measured Depth to Groundwater (m) [Groundwater Level (m, AHD)]		
	BH101 (12/02/2025) ¹	BH102 (13/02/2025) ¹	BH103 (14/02/2025) ¹
20/02/2025	3.5 [2.7]	2.6 [4.2]	3.9 [2.6]
26/03/2025	3.25	2.9	2.75

Date of Reading	Measured Depth to Groundwater (m) [Groundwater Level (m, AHD)]		
	BH101 (12/02/2025) ¹	BH102 (13/02/2025) ¹	BH103 (14/02/2025) ¹
	[3.35]	[3.94]	[3.75]
19/05/2025	2.8 [3.8]	2.48 [4.4]	3.12 [3.4]

Note: ¹ Groundwater monitoring well installation date.

Table 4: Summary of Groundwater Monitoring Results (logger data)

Location ID	Datalogger Installation Date	Groundwater Level During Monitoring Period (RL m AHD)		
		Minimum	Maximum	Average
BH101	13/02/2025	3.30 (4/03/2025)	3.81 (5/05/2025)	3.52
BH102	14/02/2025	3.90 (4/03/2025)	4.40 (6/05/2025)	4.10
BH103	14/02/2025	2.66 (26/02/2025)	3.41 (17/05/2025)	2.93

It should be noted that groundwater levels vary over time due to seasonal, climatic and other factors.

Some of the measured water may be associated with perched seepage along the clay and rock surface and within the extremely weathered rock and not necessarily a permanent groundwater table.

4.2.2 Hydraulic conductivity testing

Rising head permeability tests were carried out in wells BH101, BH102 and BH103 on 14 February 2025. These were carried out by purging the well then measuring the rise in water level at regular time intervals using a data logger.

The detailed results of the permeability tests are attached in Appendix E. A summary of the test results is provided in Table 5.

Table 5: Interpreted hydraulic conductivity results

Well ID	Screened lithology	Interpreted k (m/s)
BH101	Sandy soil and moderately to slightly weathered, low to high strength sandstone (2–10 m bgl)	1.7×10^{-8}
BH102	Sandy soil and extremely weathered sandstone to highly weathered, low to medium strength sandstone (2–10 m bgl)	6.9×10^{-9}
BH103	Sandy soil and extremely weathered to slightly weathered sandstone, medium strength sandstone (2–5 m bgl)	1.3×10^{-8}

Note: k: hydraulic conductivity

5. Groundwater quality

5.1 Reviewed report

Groundwater quality was assessed as part of the previous detailed site (contamination) investigation (DSI) (Douglas, 2025), with pertinent information on groundwater quality at the site discussed below.

5.2 Groundwater sampling methodology

To assess the groundwater quality onsite, sampling from the three monitoring wells (GWBH101, GWBH102 and GWBH103) was undertaken. The general sampling procedure adopted for the collection of groundwater samples and subsequent laboratory analysis comprised of:

- Prior to sampling, measuring the groundwater monitoring wells using a dip meter which can detect phase separated hydrocarbons;
- Sampling using a positive displacement low flow bladder pump via the micro-purge (minimal drawdown) method. The method minimises aeration of the sample and disturbance to the water column thereby enhancing the quality of results for oxygen sensitive analytes;
- Following stabilisation of the field parameters, groundwater samples were collected in laboratory prepared bottles and vials. Samples collected for dissolved metals analysis were filtered using a 0.45 µm filter;
- Labelling each water sample container with an individual and unique identification, including project number and sample location. The containers were then placed into an ice cooled, insulated and sealed container for transport to the laboratory (with chain-of-custody); and
- Dispatching samples to Envirolab Services, which is NATA accredited laboratory for the tests performed. The samples were analysed for a combination of the potential contaminants of concern:
 - Metals (total and dissolved);
 - Total recoverable hydrocarbons (TRH);
 - Benzene, toluene, ethylbenzene and xylenes (BTEX);
 - Volatile organic compounds (VOC);
 - Polycyclic aromatic hydrocarbons (PAH);
 - Organochlorine pesticides (OCP);
 - Organophosphorus pesticides (OPP);
 - Polychlorinated biphenyls (PCB);
 - Per- and polyfluoroalkyl substances (PFAS);
 - pH / turbidity / hardness;
 - Oil and grease;
 - Total dissolved solids (TDS); and

- Total suspended solids (TSS).

Note: due to the limited water present in GWBH103 at the time of sampling, micropurging and collection of field parameters was not able to be undertaken.

Groundwater results, and relevant SAC, are shown in Table J4 in Appendix F, and the laboratory certificate and chain of custody documentation is provided in Appendix F.

5.3 Field results

No non-aqueous phase liquid was recorded by the interface meter and no hydrocarbon odour was noted during development or sampling. The purge groundwater was light brown and silty during sampling. The physical parameters recorded during sampling are summarised in Table 6.

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

Well / Sample ID	Temp. (°C)	DO (ppm)	Turbidity	EC (µS/cm)	pH	Redox (mV)
BH101	23.2	-0.20	75.17	12.2	3.81	409.4
BH102	22.5	-0.17	37.82	18.4	5.13	230.7
BH103	Insufficient groundwater in well to obtain parameters					

5.4 Discharge criteria

The adopted screening levels are summarised in Table 7 and are based on the following:

- ANZECC Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000);
- NHMRC Guidelines for Managing Risks In Recreational Water (NHMRC, 2008); and
- ANZG Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018).
- HEPA PFAS National Environmental Management Plan (NEMP) (HEPA, 2025)

Table 7: Summary of screening criteria (units given in µg/L unless otherwise stated)

Analyte		Marine DGV (95% LOP)	Physical Parameters
Metals	Arsenic (III / V)	24 / 13	-
	Cadmium	0.7	-
	Chromium (III / VI)	4.4	-
	Copper	1.3	-
	Mercury (inorganic)	0.1	-
	Lead	4.4	-
	Nickel	7	-

Analyte		Marine DGV (95% LOP)	Physical Parameters
	Zinc	8	-
	Manganese	80	-
TRH	C ₆ -C ₁₀	10 (< PQL) ^d	-
	C ₁₀ -C ₁₆	50 (< PQL) ^d	-
	C ₁₆ -C ₃₄	100 (< PQL) ^d	-
	C ₃₄ -C ₄₀	100 (< PQL) ^d	-
Oil and Grease		5000 (< PQL) ^d	Nonvisible
BTEX	Benzene	500 ^a	-
	Toluene	180	-
	Ethylbenzene	80	-
	Xylenes (m-, o- & p-)	75 / 350 / 200	-
PAH	Anthracene	0.01 ^a	-
	Benzo(a)pyrene	0.1 ^a	-
	Fluoranthene	1 ^a	-
	Naphthalene	50 ^a	-
	Phenanthrene	0.6 ^a	-
PCB	Aroclor 1254 (as a preliminary screen)	0.01	-
	Aroclor 1242	0.3	-
OCP	Aldrin ^a (as a preliminary screen)	0.003	-
	Chlordane	0.001	-
	DDT	0.0004	-
	Dieldrin	0.01	-
	Endosulfan	0.005	-
	Endrin	0.004	-
	Heptachlor	0.0004	-
	Methoxychlor	0.004	-
OPP	Chlopyrifos ^a (as a preliminary screen)	0.009	-
	Diazinon	0.01	-
	Dimethoate	0.15	-

Analyte		Marine DGV (95% LOP)	Physical Parameters
	Fenitrothion	0.001	-
	Malathion	0.05	-
	Parathion	0.004 ^e	-
VOC	Tetrachloroethene (PCE)	70 ^e	-
	Trichloroethene (TCE)	330 ^e	-
	cis-1,2-dichloroethene (DCE)	700 ^e	-
	Chloroethene (vinyl chloride / VC)	100 ^e	-
	Tetrachloromethane (carbon tetrachloride / CT)	240 ^e	-
	Trichloromethane (chloroform / TCM)	370 ^e	-
PFAS			
	PFOS 95% LOP	0.13	-
	PFOA 95% LOP	220	-
Nutrients - Dissolved	Ammonia as N	900	
Physical Parameters	Conductivity	-	125 - 2200 µs/cm ^f
	pH	-	6-8 ^f (6.5-8.5) ^h
	Dissolved Oxygen	-	85-120 % saturation ^f
	Turbidity	-	6-50 NTU ^f
	Total Suspended Solids	-	< 50 mg/L ^g

Notes: PQL – laboratory practical quantification limit

a – 99% LOP adopted due to bioaccumulating nature of the contaminant or as otherwise recommended as per ANZG (2018)

b – unknown LOP

c – aesthetic criteria only

d – set at the laboratory PQL, example limits given

e – as an initial screen given the exhaustive list of VOC

f – given as comparative levels for lowland rivers. Typical conductivity values for coastal rivers in NSW are cited as 200-300 µs/cm (ANZECC, 2000).

g – typical levels based on experience with previous council disposal requirements

h – range of typical neutral pH conditions.

i. 95% LOP adopted for PFAS due to ambient concentrations being above the 99% LOP and the highly disturbed nature of the receiving water body.

Groundwater investigation levels for recreational water derived from NHMRC (2008) are in Table 8.

Table 8: Groundwater investigation levels for protection of recreational waters (µg/L)

Contaminant	Recreational water guideline values
Metals / metalloids	
Arsenic	100
Cadmium	20
Chromium (VI)	500
Copper	20000
Lead	100
Manganese	5000
Mercury (inorganic)	10
Nickel	200
BTEX	
Benzene	10
Ethylbenzene	3000
Xylenes	6000
Toluene	8000
PAH	
Benzo(a)pyrene	0.1
OCP	
Aldrin + Dieldrin	3
Chlordane	20
DDT	90
Endosulfan	200
Heptachlor	3
Methoxychlor	3000
OPP	
Chlorpyrifos	100
Diazinon	40
Dimethoate	70
Fenitrothion	70
Malathion	700

Contaminant	Recreational water guideline values
Parathion	200
PFAS	
PFOS + PFHxS*	2
PFOA	10
VOC	
Tetrachloroethene (PCE)	500
cis-1,2-dichloroethene (DCE)	300
Chloroethene (vinyl chloride / VC)	3
Tetrachloromethane (carbon tetrachloride / CT)	30
Trichloromethane (chloroform / TCM)	2500

5.5 Laboratory test results

The results of the laboratory testing are included in Appendix F. All results were within the recreational thresholds.

Groundwater concentrations of several dissolved metals including arsenic, cadmium, chromium, mercury and nickel as well as organic contaminants including PAH, OCP, OPP, PCB, were within the recreation land use and 95% (LOP) marine water criteria. Copper, lead, manganese and zinc exceeding the site's assessment criteria. PFOS was recorded above the 99% LOP but within the 95% LOP marine water criteria. PFAS, particularly PFOS, was found at higher levels in up-gradient and mid-gradient wells, with the highest in up-gradient well GWBH102.

The DSI considered that:

- the PFOS, copper, manganese and zinc detected above the adopted SAC were generally consistent with expected ambient background ranges; and
- the source of the lead was not known.

TRH, toluene, bromodichloromethane and chloroform were detected above the practical quality limit (PQL) in GWBH103, likely due to interference from sediment, potable and / or drilling fluids.

Low chloroform concentrations recorded in BH101 and BH102 are considered to be within expected ambient levels.

6. Conceptual hydrogeological model

The geotechnical investigation identified that the site consists of sandy alluvial and residual soils underlain by low to medium strength Hawkesbury Sandstone. Interpreted geotechnical cross-sections are provided in Appendix B. Relatively shallow groundwater levels (between 2.5 m and 4 m below ground surface) have been observed in all boreholes.

The groundwater hydraulic gradient appears to slope downward to the northeast across the site with elevations ranging between 8 m and 6 m AHD. Groundwater within the rock below about RL 1 m may be connected to the harbour and Blackwattle Bay. Based on the proposed basement floor level (RL 2.6 m AHD), it is likely the proposed basement will extend about 1.5 m below the monitored water levels.

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.

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

7. Groundwater inflow assessment

7.1 Methodology

Seepage 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 2-dimensional (2D) numerical groundwater model was developed. The modelling was carried out using the 2D finite element hydrogeological software SEEP/W (a component of GeoStudio) developed by GEOSLOPE International Ltd. The transient conditions during construction dewatering were modelled in the analysis. Long-term 'steady-state' flow analysis was not undertaken due to the 'water-tight' tanked basement proposed.

7.2 Model geometry

A cross section aligned in the west to east direction intercepting the basement footprint was selected to run the 2D analysis. The cross sections are presented in Figure 2.

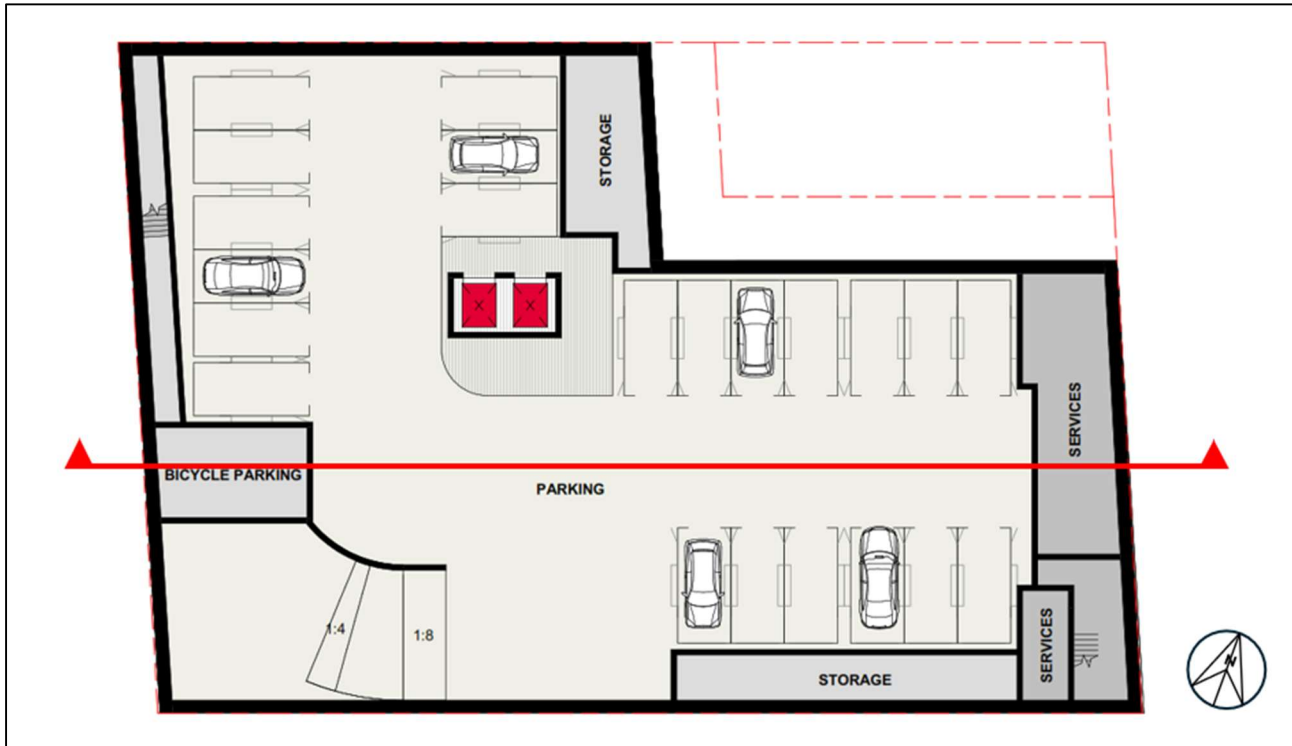


Figure 2: Model geometry and cross-section for 2D modelling

The aquifer surrounding the proposed development was simulated as a two-layer numerical model to represent the subsurface conditions beneath the site and to allow simulation of the vertical flow components. The model boundaries were extended 100 m beyond the proposed excavation boundaries.

The SEEP/W results are based on a 2D model, which assumes that the excavation is much longer than its width and provide seepage rates per unit metre. Inflow volumes were calculated through use of a shape factor based on Kavvas (1992). For the analysis, the excavation was assumed to have an approximately rectangular configuration with effective widths of about 31.5 m (B) and lengths of about 46 m (L).

7.3 Model set-up

7.3.1 Model layers

The hydrogeological units were simulated as two layers. A combined sandy alluvial/residual soil and weathered rock layer, and a sandstone bedrock layer. The fill layer has been omitted from the model as it does not intersect the groundwater level during the proposed excavation works. Adopted hydraulic properties (baseline case) are presented in Table 9.

Parameters were selected based on the results of hydraulic conductivity testing (Section 4.2.2), range of values documented in available literature for similar lithologies (e.g. Fetter 1994 and Hoek & Bray 1981) and previous experience with similar materials.

Table 9: Model layers and adopted hydraulic properties

Layer	Material	Saturated k_h (m/s)	Anisotropy Ratio (k_v/k_h)	Saturated VWC	Material Model Adopted
1	Soil and Weathered Rock	1.0×10^{-5}	1.0	0.2	Unsaturated / Saturated
2	Sandstone	1.7×10^{-8}	0.3	0.1	Unsaturated / Saturated

Notes: k_v is vertical hydraulic conductivity
 k_h is horizontal hydraulic conductivity
 VWC is volumetric water content

7.3.2 Initial groundwater elevation and boundary conditions

As the proposed development is located within a residential setting with predominantly paved surroundings, a net infiltration percentage of 1% was assigned as water influx over the ground surface. Based on historical data from the Bureau of Meteorology Sydney Observatory Hill station (station number 66214), an annual rainfall of 1.2 m was adopted. This equates to a rainfall influx of $3.8 \times 10^{-10} \text{ m}^3/\text{sec}/\text{m}^2$ over the ground surface.

The model adopted an average of the water levels recorded in the wells during long-term monitoring, resulting in a constant head boundary of RL 4.1 m AHD on the western boundary and RL 3 m AHD on the eastern boundary of the model.

7.3.3 Basement design and dewatering

The proposed basement walls (secant pile wall) were simulated as 'Seepage Faces' in SEEP/W with zero hydraulic pressure head along the full height.

It was assumed that a 600 mm diameter secant pile wall, with an effective width of 500 mm, socketed 0.5 m into the underlying sandstone below bulk excavation, will be used for shoring of the basement excavation. The required embedment depth of the secant piles should be confirmed by the project structural engineer. However, it is considered that the assumed embedment depth in the analysis will not significantly affect the results.

The lowest proposed finished floor level (FFL) of the basements is RL 2.6 m AHD. Douglas has assumed the bulk excavation level will be 0.5 m below FFL, at RL 2.1 m AHD.

It has been assumed that the construction dewatering will be required for one year for the proposed basement. The Baseline Case model set-up is presented in Figure 3.

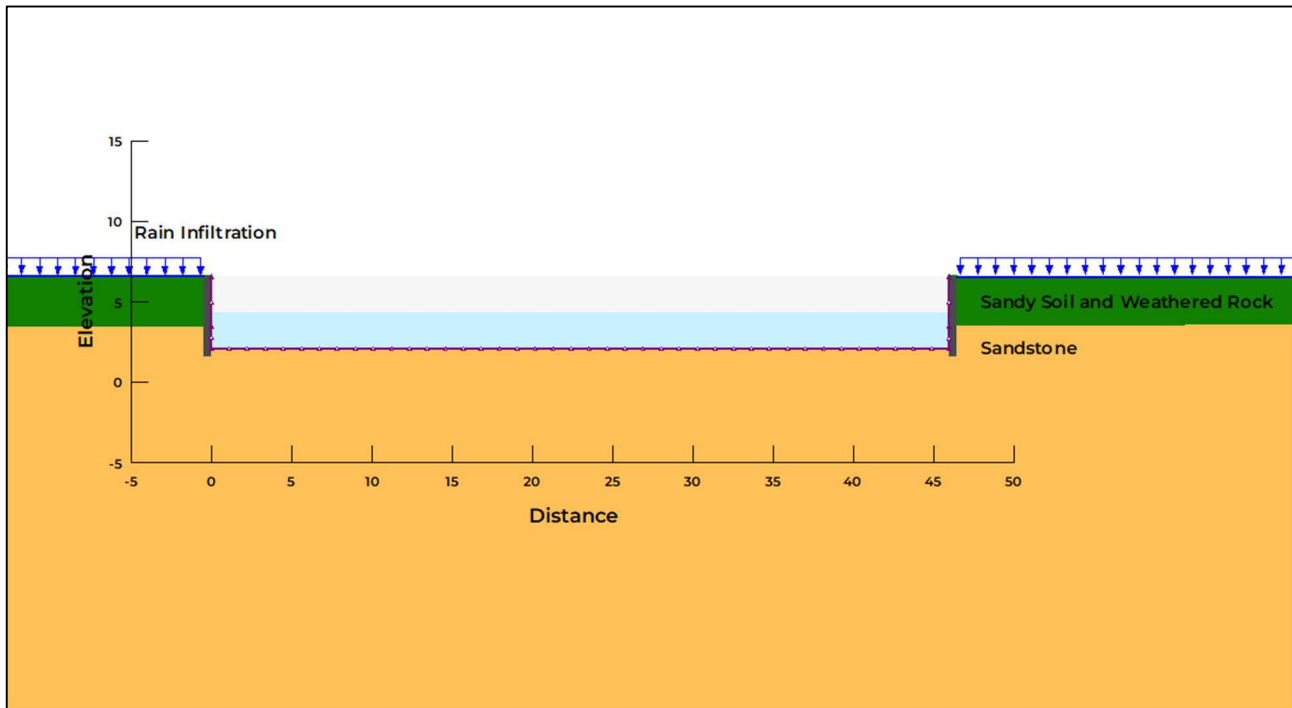


Figure 3: Model set-up (Baseline Case)

7.3.4 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 one year, subdivided into multiple time intervals.

7.3.5 Sensitivity analysis

Sensitivity analyses were undertaken to assess the impact of intersecting more permeable ground conditions or a shallower water table. The sensitivity cases adopted are outlined below:

- Sensitivity Case 1: higher hydraulic conductivity encountered within the excavation, with hydraulic conductivity increased to 1.0×10^{-4} m/s for Layer 1 (sandy soil) and 1.7×10^{-7} m/s for Layer 2 (sandstone bedrock); and
- Sensitivity Case 2: assuming the water table is 2 m higher than Baseline Case following heavy rainfall.

7.4 Modelling results

7.4.1 Groundwater inflow

The inflow rates 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 construction.

The estimated inflows from the analysis during the construction (first year) and are summarised in Table 10. The estimated inflows from sensitivity cases are summarised in Table 11.

Table 10: Simulated inflow results for Baseline Case

Elapsed Time	Baseline case – predicted inflow	
	kL/day	Cumulative (ML)
1 day	0.0	0.00
3 days	0.6	0.00
7 days	0.6	0.00
14 days	0.6	0.01
21 days	0.6	0.01
30 days	0.6	0.02
60 days	0.5	0.03
90 days	0.5	0.05
180 days	0.5	0.10
365 days	0.5	0.19

Table 11: Simulated inflow results for Sensitivity Cases

Case	Baseline case – predicted inflow	
	kL/day	Cumulative (ML)
Sensitivity Case 1 (365 days)	1.9	0.78
Sensitivity Case 2 (365 days)	0.5	0.46

The results of the groundwater inflow analysis indicate that under both baseline and sensitivity hydrogeological conditions, inflows are predicted to be less than 1 ML/year. It is noted that the precision to which the results are presented does not represent the accuracy of the predictions, the level of precision is provided to allow comparison of scenarios, the accuracy will be lower because of the inherent variability in key parameters such as hydraulic conductivity and recharge and results could range up to an order of magnitude, in which instance the flows would be less than 3 ML/year.

The inflow rates presented above are predictions 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 put in place to monitor and compensate for greater variations in actual inflows.

7.4.2 Drawdown and settlement

The results of the analysis predict that a maximum drawdown of approximately 0.3 m adjacent to the assumed bulk excavation level, decreasing to less than 0.1 m at a distance of 100 m from the excavation.

Based on the results of the geotechnical investigation, the groundwater drawdown is expected to occur within the sandstone bedrock. Settlements on adjacent structures due to the drawdown in this rock are expected to be negligible.

8. Impact assessment

8.1 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.

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

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

8.2 Contamination

The available data, as discussed in Section 5.4, indicates that groundwater will require treatment prior to disposal.

An additional round of groundwater testing is recommended prior to commencing dewatering, to further inform treatment requirements. The DSI (Douglas, 2025) identified historical off-site commercial / industrial land uses as a potential source of contamination. This could impact groundwater quality during dewatering, including variation in quality than recorded in pre-dewatering analysis.

8.3 Risk assessment

An assessment of the potential effects of dewatering on neighbouring properties and groundwater receptors has been summarised in Table 12.

Table 12: Assessment of potential effects of dewatering

Item	Comment
Impacts on potential GDEs	No GDE is identified within 1 km radius of the site (Section 3.3). Drawdown impacts are predicted to be negligible at this distance from the site.
Water supply losses by neighbouring groundwater users	The closest registered extraction bore is 150 m southwest from the site (Section 3.2). Drawdown impacts are predicted to be insignificant at this distance from the site.
Potential subsidence of neighbouring structures	Groundwater drawdown is predicted to occur within sandstone bedrock. Therefore, risk of subsidence due to lowering of the water table is expected to be minimal.
Mounding of water upgradient of structure	As the basement is proposed to be tanked, mounding of groundwater may occur upgradient of the site but this is not expected to be significant.

9. Recommended management strategy

A tanked basement is considered suitable for this site due to the presence of a sandy soil layer, relatively shallow groundwater levels observed during long term monitoring, the underlying site geology, and the site topography. Drainage measures within the basement walls and below the basement slab will be required to collect and store water inflows for periodic discharge.

This section outlines the proposed management strategy based on the preferred methodology for dewatering and disposal.

9.1 Groundwater inflow control

Based on the inflow assessment (Section 7), seepage inflows are expected to be relatively low. These flows in the short should be readily controllable by pumping from sumps for discharge to the stormwater. Standard subfloor drainage systems should be sufficient to direct the seepage water into the sumps. It should be noted that seepage may temporarily increase following high rainfall events.

Appropriate planning should be in place to monitor and compensate for possible variations in the actual inflow rate. If higher inflows are encountered, grouting may be required to reduce the inflows.

9.2 Water quality control

Seepage water quality must be tested prior to discharge to the stormwater to prevent contamination and adverse impacts during and after construction. Based on the water testing discussed in Section 5 it is likely that some form of treatment of groundwater will be required prior to discharge.

The recommended methodology for water quality testing is as follows:

- Collection of water samples by a suitably qualified Environmental Consultant (and quality control samples) from extracted water prior and following treatment (refer to Section 9.3);
- On-site screening of water by the site contractor and / or the qualified environmental consultant for the field parameters;
- Analysis by a NATA accredited laboratory for the analytes (excluding field parameters);
- Assessment of results by the Environmental Consultant with respect to the discharge criteria (Table 13), and provision of advice to the contractor (as per contractual engagement) on the results, including and non-compliances. In the event of non-compliances the Environmental Consultant will provide recommendations with respect to the implications of the recorded results; and
- Review and update of this water quality testing methodology and analytical suite as required.

The proposed suite of analysis is provided in Table 13, below, and the analytical regime is provided in Table 14, Section 9.3.

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

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

Table 13: Proposed suite of analytes for water quality monitoring

Category	Primary Analytes	Secondary Analytes
Field parameters	pH, turbidity (visual and/or field meter), oil and grease (visual)	Temperature, EC
Physical properties	TSS	TDS
Major ions	-	Calcium, magnesium, sodium, potassium, chloride, sulphate and alkalinity (total, carbonate and bicarbonate)
Metals (total)	Arsenic, aluminium, cadmium, chromium, copper, iron, mercury, manganese, nickel, lead and zinc	-

Category	Primary Analytes	Secondary Analytes
Nutrients	Nitrate	ammonia, total phosphorus and reactive phosphorus
Organics	TRH / TPH, BTEX	VOC, phenols, PAH, PCB, OCP, OPP, oil and grease

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

Water quality results should be compared to assessment criteria for each analytes. These assessment criteria would be selected based on baseline groundwater quality results and relevant guidelines.

9.3 Monitoring and reporting requirements

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

Table 14: Monitoring and reporting requirements

Item	Monitoring requirements	Methodology
Visual inspection	Inspection of treated water to confirm: - No visible oil and grease 'sheen'. - Visually 'clear' (consistent with tap water). - No significant discolouration. - No unnatural odours.	Daily inspections (contractor). HOLD POINT - If any of the visual inspection signs are noted, then any discharge will be suspended until issue is resolved, or contingency plan implemented..
Groundwater level monitoring	Groundwater level recording from the three monitoring wells to assess drawdown in the vicinity of the site. This requirement may be deleted subject to approval with WaterNSW given the low impact.	Continuous groundwater level monitoring using data logger recording at six-hourly intervals in monitoring wells in the vicinity of the site. Groundwater level monitoring is to be undertaken during construction and to be continued one month after cessation of dewatering. Quarterly manual groundwater level measurements in monitoring wells.

Item	Monitoring requirements	Methodology
Water quality sampling and testing	Samples to be collected of treated water for analysis of water parameters set out in Table 13. Samples of untreated water to be collected and analysed as required to inform treatment.	Water quality testing is to be throughout dewatering prior to and during disposal to stormwater. The process for sampling and analysis is provided in Section 9.2 <u>Start up period</u> - Analysis for primary and secondary analytes. - Treated water: sampling and analysis prior to commencement of discharge, until at least three sequential results meet the discharge criteria. - Untreated water: sampling and analysis as required to inform treatment, comprising at least 3 samples prior to or within the first month of discharge. <u>Standard Testing Regime</u> Sampling from treated water - Weekly sampling and testing for primary analytes. - Fortnightly sampling and testing for secondary analytes where no elevated levels of exceedances of discharge criteria recorded in previous sampling rounds (treated or untreated water) Sampling from untreated water - Analysis of untreated water as required to inform treatment. <u>Review of Testing Regime</u> Environmental Consultant to review sampling regime periodically. Environmental Consultant may make recommendations to reduce or otherwise amend the analytical suite / sampling frequency, subject to Council approval. HOLD POINT – If concentrations exceed discharge criteria, then contingency strategy to be adopted.

Item	Monitoring requirements	Methodology
		Inclusion of results in a final water quality monitoring report.
Quality control sampling	Collection of replicate samples to verify quality of laboratory results. Testing suite to include: - Metals (total); - TRH; - BTEX; and - PAH.	At a rate of 10% of samples tested. Samples will be recorded using industry standard COC documentation, including the date, sample ID, name and signature of sampler, and transportation records to the NATA accredited laboratory. Inclusion of results in a final water quality monitoring report
Quantity of groundwater inflows	Measurements of groundwater volumes contained in the sumps.	Weekly monitoring and recording of dewatering volumes. HOLD POINT - If dewatering volumes exceed those outlined in Section 7 then construction will be halted to minimise inflows (e.g., grouting of exposed basement faces). Alternatively a higher inflow limit must be approved by WaterNSW and Council. Presumably a limit up to 3 ML/year would be possible. Weekly reporting of volumes to the Environmental Consultant. Inclusion of results in a final water monitoring report.
Dewatering completion report	To be prepared by a suitably qualified consultant upon completion of all dewatering works. The summary report will incorporate the above information and: - Any on-site records kept by the contractor (e.g., visual observations, any unexpected finds records, etc.); - All analytical results (i.e., each batch of water disposed) compared to the adopted assessment criteria; - Quality control testing; - Record of dewatering volumes (i.e., for each discharge event); and Comment on any unexpected finds or non-conformances, and / or otherwise if the dewatering works have complied with this DMP.	

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

9.4 Personnel and responsibilities

Table 15 outlines the proposed project personnel and relevant responsibilities as part of the management plan.

Table 15: Nominated personnel and responsibilities

Role	Organisation	Responsibilities
Site Manager / Contractor	TBC	Routine visual inspection. Monitoring / recording of 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	Douglas Partners – 02 9809 0666	Water quality sampling (analysis using NATA accredited laboratories). Interim advice for compliance with discharge requirements. Quality control sampling. Assist in preparation of the dewatering completion report.

9.5 Contingency plan

As per Section 9.3, at any hold point if any non-conformance is encountered then dewatering will be suspended. The following general contingency plan will be enacted:

- Notify the Site Manager / Contractor and Environmental Consultant.
- Should an exceedances of the visual inspection of discharge criteria be recorded:
 - o the contractor will amend the treatment to address the issue(s) of concern;
 - o the Environmental Consultant will assess the risk of unacceptable impact. Environmental Consultant to inspect the site / unexpected finds and collect additional water quality samples as required to assess the issue of concern;
- Should water quality be deemed unsuitable for disposal to stormwater pending further treatment/ assessment
- Should water quality be deemed unsuitable for disposal to stormwater pending further treatment/ assessment, suspend dewatering stormwater disposal pending receipt of advice from the Environmental Consultant that the discharge criteria are being met and associated approval from Council. Dewatering may be suspended to achieve this, or alternative disposal options adopted. These could include an application(s) to Sydney Water, for discharge to the sewer network, and / or to Water NSW, for reinjection into the ground or off-site disposal to a

liquid waste facility (noting: disposal to sewer and reinjection are unlikely to be suitable short-term options given the approval requirements); and and treat water prior to discharge to the ground;

- Should dewatering volumes be higher than predicted, suspend construction and undertake grouting to reduce groundwater inflows.

10. Conclusion

From a geotechnical engineering perspective, it is considered that a tanked basement is feasible without significant impact to surrounding groundwater systems or properties.

The results of the inflow assessment suggest groundwater inflows would be about less than 1 ML/year during the first year of construction under baseline conditions. Sensitivity cases with adverse conditions suggest the first year of construction inflows could be up to 0.5 ML/year under wet weather conditions and up to 0.8 ML/year if the hydraulic conductivity of sandy soil and the sandstone is higher than measured. These predictions are estimates based on the information available; actual flow rates may vary from these and will only be known once the excavation is complete and inflow rates can be measured.

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

11. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 41-49 Mountain Street, Ultimo NSW in line with Douglas' proposal dated 29 November 2024 and acceptance received from Juey Thanyakittikul of Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2 for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

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

Appendix A

About This Report

Introduction

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

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

Copyright

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

Borehole and Test Pit Logs

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

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

Groundwater

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

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

the time of construction as are indicated in the report; and

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

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

Reports

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

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

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

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

continued next page

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

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Appendix B

Drawings



LEGEND

- Geotechnical Borehole Locations (Groundwater Wells)
- Environmental Borehole Locations
- Borehole Location (1-3 Smail Street)
- Approximate Site Boundary
- Cross Section

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	24.03.2025	EC
SCALE: 1:250 @ A3			

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

CLIENT:
Apt.Residential Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 27.01.2025)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Mixed Use Development

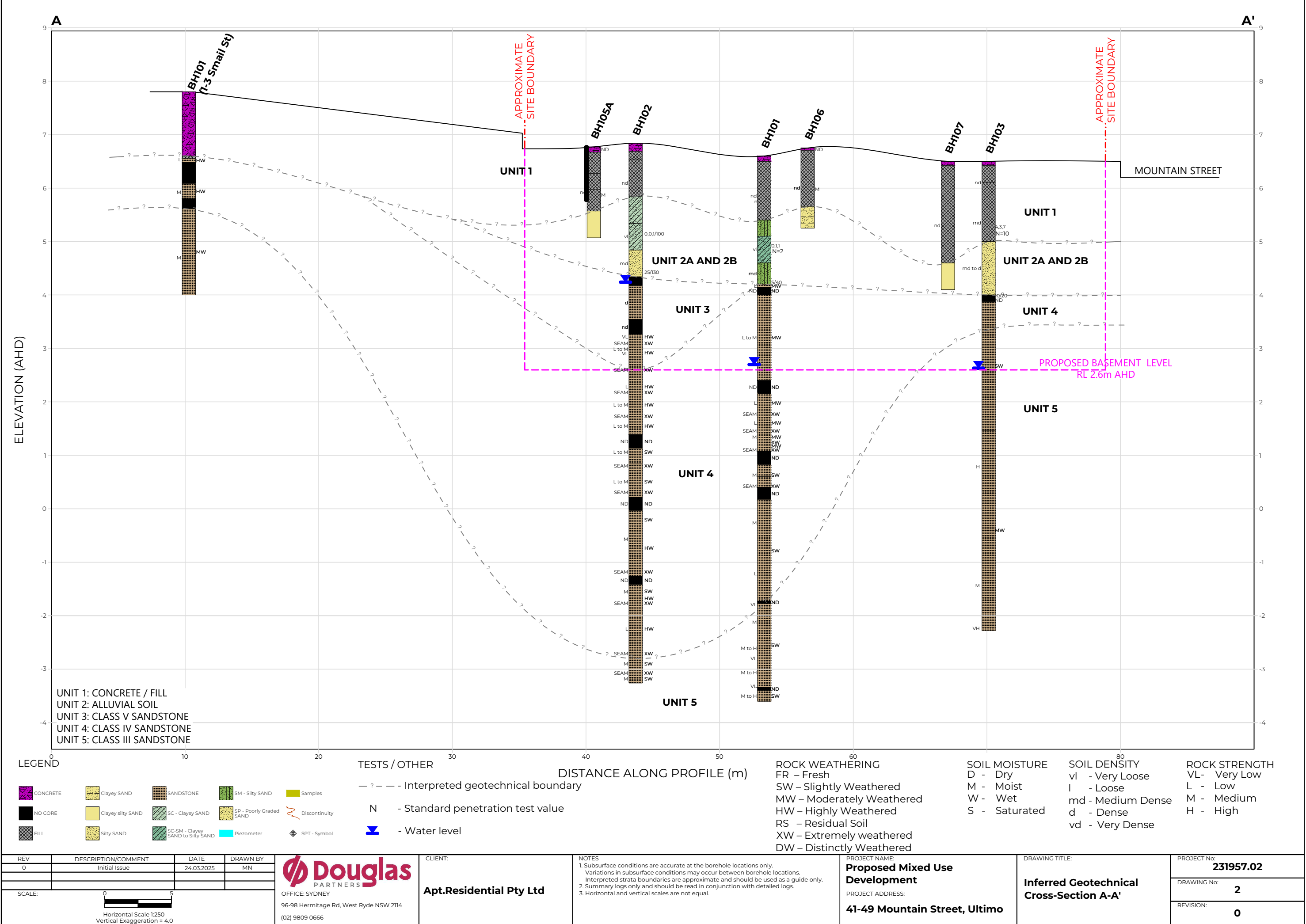
PROJECT ADDRESS:
41-49 Mountain Street, Ultimo

DRAWING TITLE:
Test Location Plan

PROJECT NO:
231957.02

DRAWING NO:
1

REVISION:
0



Appendix C

Borehole Logs

Introduction to Terminology, Symbols and Abbreviations

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

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

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

Abbreviation Codes

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

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

Data Integrity Codes

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

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

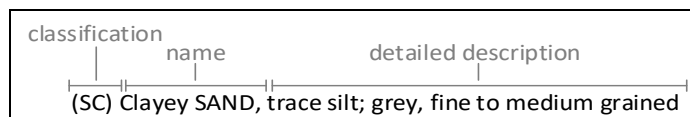
Graphic Symbols

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

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Introduction

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



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

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

Particle size designation and Behaviour Model

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

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

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

¹ – refer grain size subdivision descriptions below

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

Component proportions

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

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

¹ As defined in AS1726-2017 6.1.4.4

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

Composite Materials

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

Classification

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

Soil Name

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

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

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

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

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

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

Identification of minor components

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

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

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

Soil Composition

Plasticity

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

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

Grain Size

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

Grading

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

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

Soil Condition

Moisture

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

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

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

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

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

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

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

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

Consistency (fine grained soils)

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

Relative Density (coarse grained soils)

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

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

Compaction (anthropogenically modified soil)

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

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

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

Soil Origin

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

Cobbles and Boulders

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

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

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Rock Strength

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

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

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

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

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

Degree of Alteration

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

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

Degree of Fracturing

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

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

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Defect Descriptions

Defect Type

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

Rock Defect Orientation

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

Rock Defect Coating

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

Rock Defect Infill

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

Rock Defect Shape/Planarity

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

Rock Defect Roughness

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

Defect Orientation

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

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Sampling and Testing

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

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

Sampling

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

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

¹ – numeric suffixes indicate tube diameter/width in mm

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

Field and Laboratory Testing

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

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

Field and laboratory testing (continued)

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

Groundwater Observations

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

Drilling or Excavation Methods/Tools

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

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

¹ – numeric suffixes indicate tool diameter/width in mm

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2

PROJECT: Proposed Mixed Use Development

LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.6 AHD

COORDINATE: E:333156.6, N:6249348.6

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101

PROJECT No: 231957.02

DATE: 12/02/25

SHEET: 1 of 3

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

PLANT: Geo 205

METHOD: VE to 1.5m, AD/T to 2.4m, NMLC to 10.2m

REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip

CASING: HWT to 2.4m

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2

PROJECT: Proposed Mixed Use Development

LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.6 AHD

COORDINATE: E:333156.6, N:6249348.6

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101

PROJECT No: 231957.02

DATE: 12/02/25

SHEET: 2 of 3

CONDITIONS ENCOUNTERED														SAMPLE			TESTING		
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
RL (m)				PS XW HW MW SW FR		VL L M H VH	(%)		0.00 0.50 1.00 1.50 2.00 2.50 3.00										
6	1													1			Sand		
5	2													2			Bentonite		
4	3	Continued from soil log SANDSTONE: pale grey and orange-brown, fine to coarse grained, indistictly cross bedded, 0 to 15°. Hawkesbury Sandstone		MW	2.40 2.46 2.59	L				280m B, 0°, PR, VNR Clay, RF				3	PLT	PL(A)=0.28MPa			
3	4			MW		L to M	97	93		3.05m: DS, 5°, 2mm 313m: B, 10°, PR, VNR Clay, RF 326-340m: JT, 70°, PR, INF, RF, Roots grown in joint				3	PLT	PL(A)=0.33MPa			
3	4									378m: DS, 0°, 10mm 390m: CS, 0°, 5mm				4	PLT	PL(A)=0.56MPa	Sanc		
4.20 2.59	4				4.20									4					
4.45	2	SANDSTONE: pale grey and orange-brown, fine to coarse grained, indistictly cross bedded, 0 to 15°. Hawkesbury Sandstone		MW	4.45	L				4.45m DS, 0°, 50mm 4.50m JT, 85°, PR, CN, RF				5	PLT	PL(A)=0.27MPa			
5	5			XW	4.80 4.86	SEAM				4.69m DS, 5°, 30mm 4.78-491m: JT, 85° ST, INF Clay 5mm, VR				5					
5.12 5.16	5			MW	5.12 5.16	L	72	60		4.92m: DS, 5°, 5mm 4.93-5.01m: JT, 85°, IR, CN, RF 5.03m: DS, 0°, 130mm				5	PLT	PL(A)=0.55MPa			
5.35 5.39	5			MW	5.35 5.39	M				5.36m: DS, 20°, 15mm									
5.48 5.52	5			MW	5.48 5.52	M				5.49m: DS, 20°, 20mm									
5.78	1			SW	5.78	M				5.82m: B, 15°, PR, SN Fe, RF					PLT	PL(A)=0.41MPa			

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

PLANT: Geo 205

METHOD: VE to 1.5m, AD/T to 2.4m, NMLC to 10.2m

REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip

CASING: HWT to 2.4m

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.6 AHD
COORDINATE: E:333156.6, N:6249348.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 231957.02
DATE: 12/02/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED										SAMPLE			TESTING							
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE		
RL (m)																				
	6.00	SANDSTONE: pale grey and orange-brown, fine to coarse grained, cross bedded, 0 to 15°, with frequent iron-staining and extremely weathered bands/seams. Hawkesbury Sandstone.		SW	6.16	M	72	60		6.02-6.08m: JT, 60°, PR, CN, RF										
	6.20			SW	6.20	SEAM				6.08m: DS, 10°, 5mm										
	6.43									6.43-6.48m JT, 85°, PR, CN, RF										
									M	6.66m: DS, 5°, 10mm						PLT	PL(A)=0.52MPa			
	7									6.82-7.15m: JT, 85°, PR, CN, RF										
										7.31m B, 35°, PR, CN, RF						PLT	PL(A)=0.25MPa			
	8								L	7.86m: CZ, 0°, 60mm										
	8.33					8.33			VL	8.37-8.42m DS, 0°, 50 mm						PLT	PL(A)=0.50MPa			
	8.37					8.42			M	8.82m: DS, 0°, 5mm										
	9					9.03			M to H	8.96m: DS, 0°, 70mm										
						9.38			M to H	9.22m B, 10°, PR, CT CBS, RF										
						9.42			M to H	9.38m: DS, 0°, 40mm										
									M to H	9.50m: B, 10°, PR, CN, RF										
									M to H	9.68-9.70m SZ, 10°, 20 mm						PLT	PL(A)=1.0MPa			
	9.94					9.90			M to H	9.90m DS, 0°, 60mm										
	10.00					10.00			M to H	10.00-10.20m JT, 85°, IR, SN Fe, VR										
		Borehole discontinued at 10.20m depth. Target depth reached.																		

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

PLANT: Geo 205
METHOD: VE to 1.5m, AD/T to 2.4m, NMLC to 10.2m
REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip
CASING: HWT to 2.4m

CORE PHOTO LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.6 AHD
COORDINATE: E:333156.6, N:6249348.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 231957.02
DATE: 12/02/25
SHEET: 1 of 1



BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.8 AHD
COORDINATE: E:333148.3, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 231957.02
DATE: 13/02/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	0.16	CONCRETE PAVEMENT: 160 mm thick					ND								
	0.30	FILL / Silty Gravelly SAND, with clay, trace asphalt, sandstone gravel, slag: brown; fine to medium.		FILL											
	0.6	FILL / Gravelly SAND with clay trace cobbles: brown; fine to medium; fine to coarse, sandstone and igneous gravel; sandstone cobbles; with asphalt, slag; and trace terracotta, tile, and rusty metal piece.		FILL			ND								
	1.00	Clayey SAND (SC): yellow / orange; fine to medium.		ALV			M				1				
	1.50	Clayey SAND (SC), trace gravel: red-brown, orange-brown and pale grey; fine to coarse; fine to medium, ironstone gravel.		ALV		VL			SPT		1.50	SPT	0,0,1/100		
	2.00	SAND (SP), trace gravel: pale grey and yellow-brown; fine to coarse; fine, sandstone gravel.		possibly ALV		MD			ES		1.80				
	2.50	SAND with gravel trace clay: pale grey; fine to coarse; fine to medium, sandstone gravel.									1.90				
	2.67	Hawkesbury Sandstone.					ND	ND			2.00				
	3			XWM		(D)		NDF			2.20				
	3.30						ND	ND			2.35				
	3.58								SPT		2.48	SPT	25/130 (HB)		
	4														
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20,02/25 07:00

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Continued as rock log

Backfill

Bentonite

Sand

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.

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

PLANT: Geo 205
METHOD: VE to 1.5m, AD/T to 2.5m, NMLC to 10.1m
REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip
CASING: HWT to 2.5m

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2

PROJECT: Proposed Mixed Use Development

LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.8 AHD

COORDINATE: E:333148.3, N:6249336.8

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102

PROJECT No: 231957.02

DATE: 13/02/25

SHEET: 2 of 3

[illegible]

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

PLANT: Geo 205

METHOD: VE to 1.5m, AD/T to 2.5m, NMLC to 10.1m

REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip

CASING: HWT to 2.5m

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.8 AHD
COORDINATE: E:333148.3, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 231957.02
DATE: 13/02/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED											SAMPLE			TESTING				
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	6.00	SANDSTONE: pale grey, orange-brown and red-brown, fine to coarse grained, cross bedded, 0 to 10°; with abundant iron-staining and extremely weathered seams, highly fractured. Occasional carbonaceous lenses. Hawkesbury Sandstone.		XW		SEAM			SEAM									
	6.22			SW		L to M	79	17			6.44m: DS, 10°, 370mm				PLT	PL(A)=0.31MPa		
	6.45			XW		SEAM												
	6.62																	
	6.88																	
	7	SANDSTONE: orange-brown and red-brown, then grey, fine to coarse grained, 0 to 10°, thinly laminated, occasional carbonaceous lenses. Hawkesbury Sandstone		SW			80	10		7.02m: DS, 0°, 20mm 7.05m JT, 45°, PR, INF Clay 2mm, SM 7.13m JT, 45°, PR, INF Clay 25mm, RF 7.23m JT, 45°, PR, INF Clay 25mm, RF				7	PLT	PL(A)=0.42MPa		
	7.20			HW		M				7.56m: JT, 60°, PR, VNR Clay, SM					PLT	PL(A)=0.56MPa		
	7.94			XW		SEAM				7.68-7.86m DS, 0°, 15mm, x4				8				
	8.10									7.94m: DS, 0°, 160mm								
	8.26																	
	8.53			SW		M									PLT	PL(A)=0.73MPa		
	8.68			XW		SEAM				8.53m: DS, 0°, 150mm					PLT	PL(A)=0.13MPa		
	9			HW		L	90	80		8.76-8.83m: JT, 70°, IR, CN, RF 8.95m DS, 0°, 20mm				9				
	9.50			XW		SEAM				9.50m: DS, 0°, 110mm					PLT	PL(A)=0.13MPa		
	9.60			SW		M									PLT	PL(A)=0.52MPa		
	9.88			XW		SEAM												
	9.94			SW		M				9.88m DS, 5°, 140mm				10	PLT	PL(A)=0.60MPa		
	10		Borehole discontinued at 10.10m depth. Target depth reached.															
	11																	
	12																	
	13																	
	14																	
	15																	

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

PLANT: Geo 205
METHOD: VE to 1.5m, AD/T to 2.5m, NMLC to 10.1m
REMARKS:

OPERATOR: Ground Test (JJ)

LOGGED: S.Pourkazemi/C.Yip
CASING: HWT to 2.5m

CORE PHOTO LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.8 AHD
COORDINATE: E:333148.3, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 231957.02
DATE: 13/02/25
SHEET: 1 of 1



BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.5 AHD
COORDINATE: E:333174.7, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 231957.02
DATE: 14/02/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	0.08	CONCRETE PAVEMENT: 80 mm thick													
	0.40	FILL / Clayey SAND, with silt, trace ash, asphalt, broken glass pieces: brown/yellow; fine to medium.		FILL			ND								
	1	FILL / SAND, trace clay, trace gravel: brown and grey-brown; fine to medium; fine to medium, igneous, sandstone and ironstone gravel.		FILL			MD				1				
	1.50	SAND (SP), with clay, trace gravel: red-brown and orange-brown; fine to coarse; fine, sandstone gravel.					M		A/ASS		1.30				
	2			possibly RS			MD to D		A/ASS		1.50				
	2.50	Continued as rock log							A/ASS		1.70				
	3										2.00				
	3										2.20				
	4										2.50				
	5										3				
	5										4				
	1										5				
	1														

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

PLANT: Geo 305
METHOD: VE to 0.8m, AD/T to 2.5m, HQ to 8.78m
REMARKS:

OPERATOR: Terratest (MB)

LOGGED: S.Pourkazemi/C.Yip
CASING: PWT to 2.5m

BOREHOLE LOG

PROJECT: Proposed Mixed Use Development

LOCATION: 41-49 Mountain Street, Ultimo, NSW

COORDINATE: E:333174.7, N:6249336.8

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

PROJECT No: 231957.02

DATE: 14/02/25

SHEET: 2 of 3

[illegible]

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

PLANT: Geo 305

OPERATOR: Terratest (MB)

LOGGED: S.Pourkazemi/C.Yig

METHOD: VE to 0.8m, AD/T to 2.5m, HQ to 8.78m

CASING: PWT to 2.5m

REMARKS:

BOREHOLE LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

SURFACE LEVEL: 6.5 AHD
COORDINATE: E:333174.7, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 231957.02
DATE: 14/02/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED											SAMPLE			TESTING										
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.			DEPTH (m)	STRENGTH			RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
			[CONT] SANDSTONE: orange-brown then grey with occasional purple and red-brown, fine to coarse grained, laminated, 0 to 20°, indistictly cross bedded, 0 to 20°; occasional carbonaceous lenses, indistinct. Hawkesbury Sandstone		PS	XW	HW	DW	MW	SW	FR													
	-0																							
	7																							
	-1																							
	8																							
	-2																							

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

PLANT: Geo 305
METHOD: VE to 0.8m, AD/T to 2.5m, HQ to 8.78m
REMARKS:

OPERATOR: Terratest (MB)

LOGGED: S.Pourkazemi/C.Yip
CASING: PWT to 2.5m

CORE PHOTO LOG

CLIENT: Evolution MIT Services Pty Ltd as trustee for Apt Hold Trust 2
PROJECT: Proposed Mixed Use Development
LOCATION: 41-49 Mountain Street, Ultimo, NSW

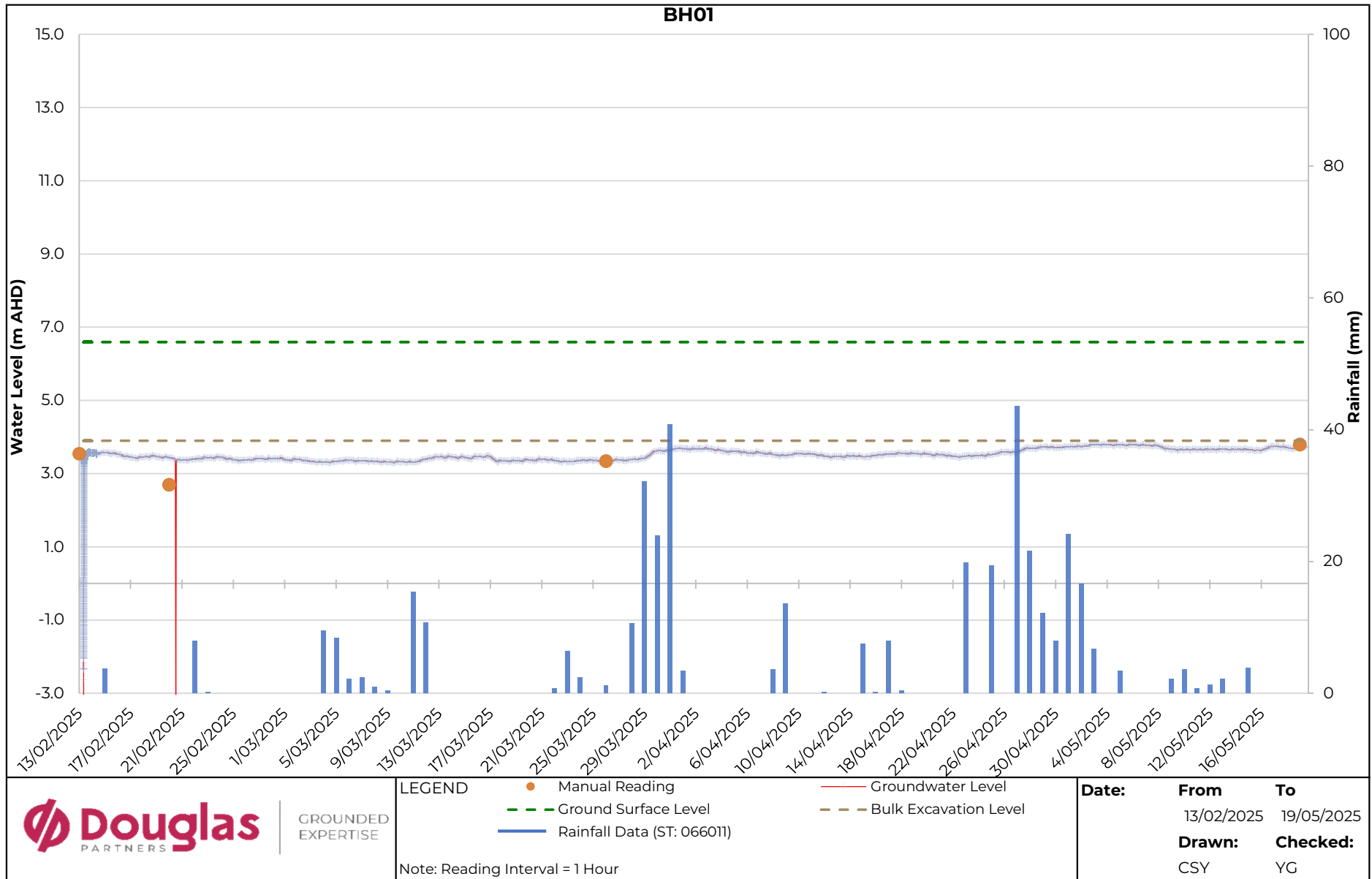
SURFACE LEVEL: 6.5 AHD
COORDINATE: E:333174.7, N:6249336.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 231957.02
DATE: 14/02/25
SHEET: 1 of 1

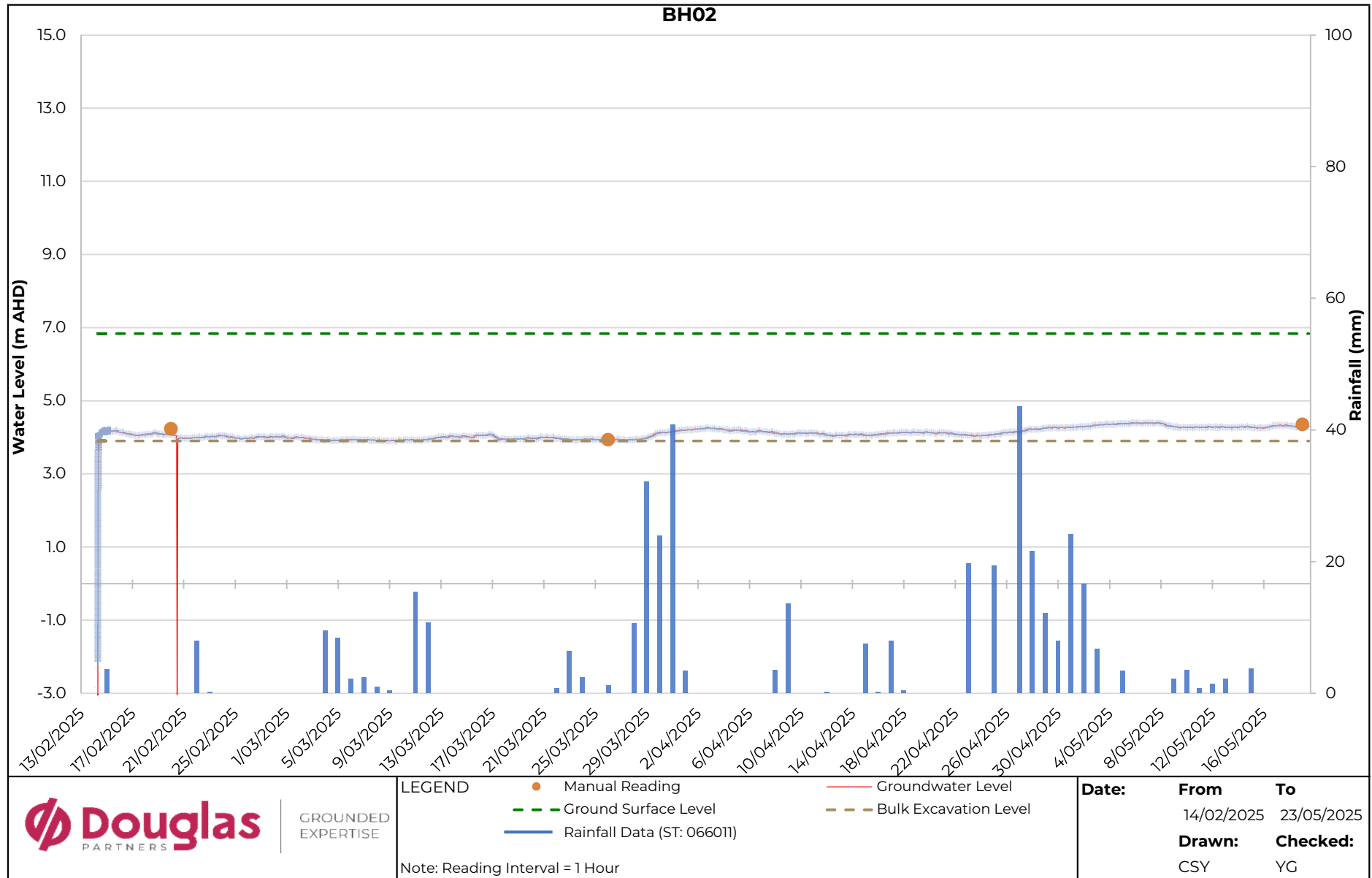


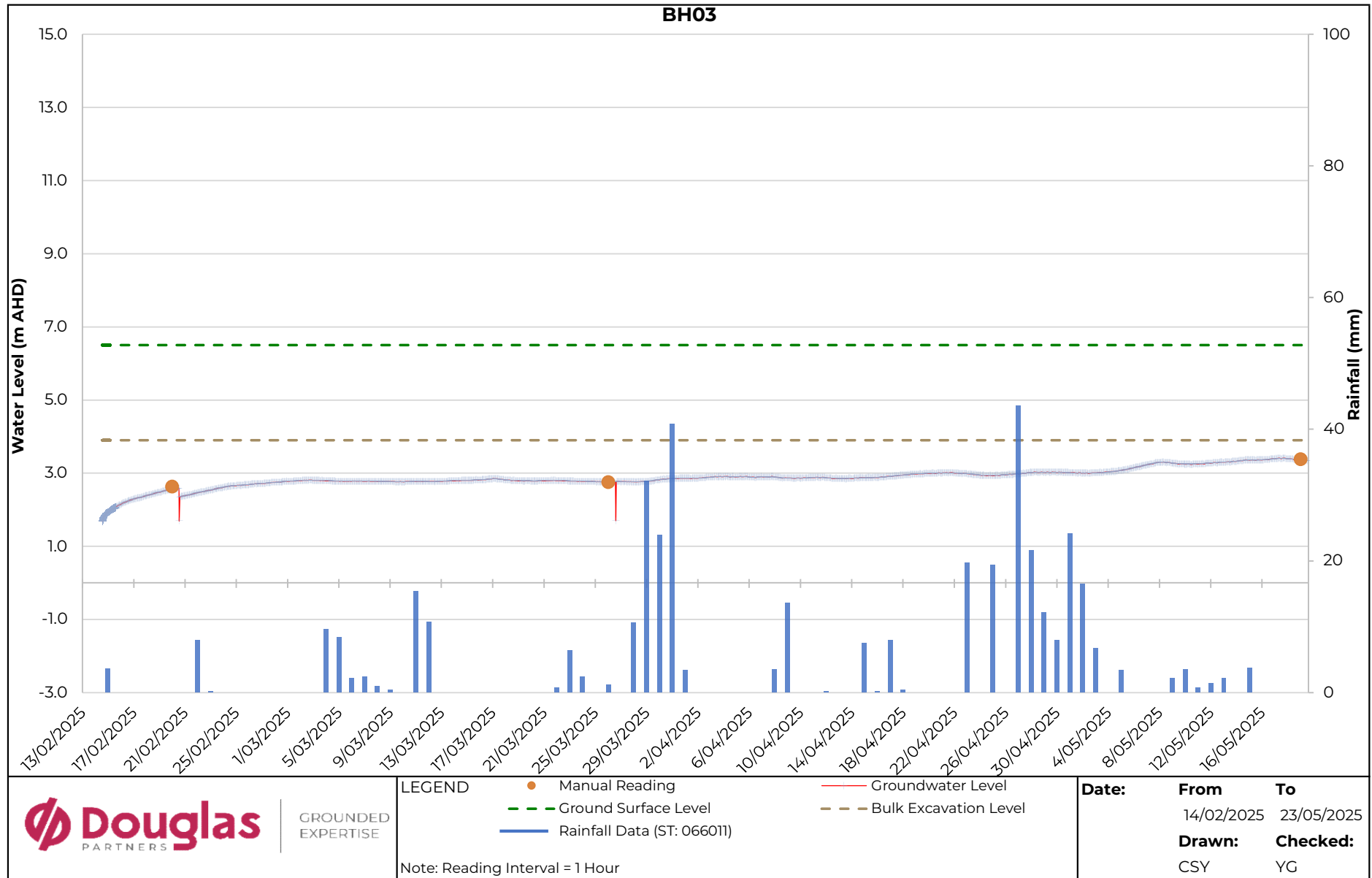
Appendix D

3-Month Groundwater Monitoring Hydrographs



1063





Appendix E

Hydraulic Conductivity Test Results

Permeability Testing - Rising Head Test Report

Client:	Apt. Residential Pty Ltd
Project:	Proposed Mixed Use Development
Location:	41-49 Mountain Street, Ultimo NSW

Project No:	231957.02
Test date:	14-Feb-25
Tested by:	CSY

Test Location

Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

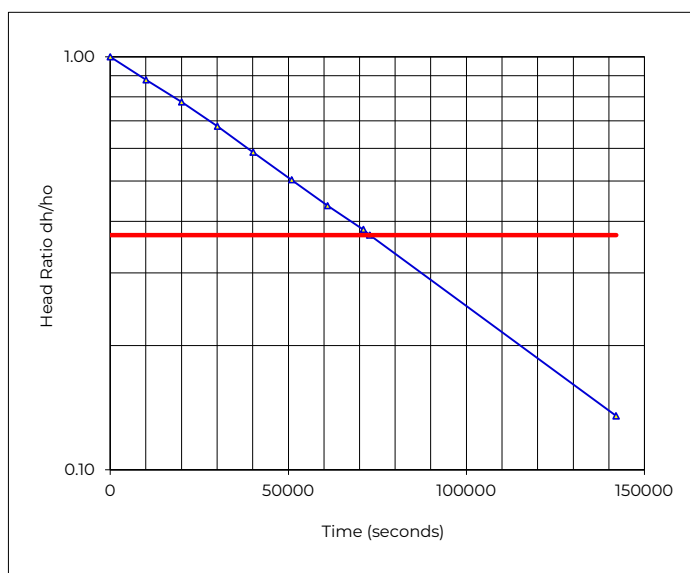
Test No.	BH102	
Easting:	333148.3	m
Northing	6249336.8	m
Surface Level:	6.8	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm
borehole diameter (2R)	76	mm
Effective Length of well screen (Le)	7.55	m

Depth to water before test	2.55	m
Depth to water at start of test	8.9	m
Depth of top of PVC standpipe	2.1	m
Depth of base of PVC standpipe	10.1	m

Test Results

[illegible]

To = 1214.0 mins
72840 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

$$k = [r^2 \ln(L_e/R)]/2L_e \text{ To}$$

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 = 6.9E-09 m/sec

= 0.001 m/day

Permeability Testing - Rising Head Test Report

Client:	Apt. Residential Pty Ltd
Project:	Proposed Mixed Use Development
Location:	41-49 Mountain Street, Ultimo NSW

Project No:	231957.02
Test date:	14-Feb-25
Tested by:	CSY

Test Location

Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

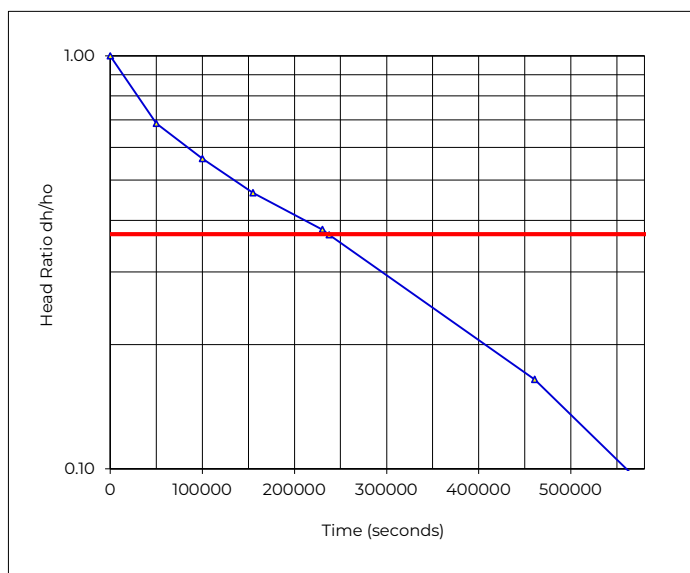
Test No.	BH103	
Easting:	333174.7	m
Northing	6249336.8	m
Surface Level:	6.5	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm
borehole diameter (2R)	96	mm
Effective Length of well screen (Le)	1.25	m

Depth to water before test	3.75	m
Depth to water at start of test	4.9	m
Depth of top of PVC standpipe	2.0	m
Depth of base of PVC standpipe	5.0	m

Test Results

[illegible]

To = 3960.0 mins
2.38E+05 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

$$k = [r^2 \ln(L_e/R)]/2L_e \text{ To}$$

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-08 m/sec

= 0.001 m/day

Appendix F

Laboratory Results for Water Analysis

CERTIFICATE OF ANALYSIS 373722

Client Details

Client	Douglas Partners Pty Ltd
Attention	Nerilee Edwards
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>231957.01, Ultimo</u>
Number of Samples	6 Water
Date samples received	21/02/2025
Date completed instructions received	21/02/2025

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.

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

Report Details

Date results requested by	28/02/2025
Date of Issue	28/02/2025
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Inorganics Supervisor
 Dragana Tomas, Senior Chemist
 Giovanni Agosti, Group Technical Manager
 Nick Sarlamis, Assistant Operation Manager
 Sean McAlary, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in water				
Our Reference		373722-1	373722-2	373722-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water
Date Extracted	-	24/02/2025	26/02/2025	24/02/2025
Date Analysed	-	25/02/2025	27/02/2025	25/02/2025
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	2	7
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	81
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		373722-1	373722-2	373722-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		20/02/2025	20/02/2025	20/02/2025
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	%	110	100	110
Surrogate Toluene-d8	%	96	91	97
Surrogate 4-Bromofluorobenzene	%	104	102	105

vTRH(C6-C10)/BTEXN in Water

Our Reference		373722-1	373722-2	373722-3	373722-4	373722-5
Your Reference	UNITS	BH101	BH102	BH103	GWD1/20250220	TS/20250220
Date Sampled		20/02/2025	20/02/2025	20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	24/02/2025	26/02/2025	24/02/2025	24/02/2025	24/02/2025
Date analysed	-	25/02/2025	27/02/2025	25/02/2025	25/02/2025	25/02/2025
TRH C ₆ - C ₉	µg/L	<10	<10	84	<10	[NA]
TRH C ₆ - C ₁₀	µg/L	<10	<10	90	<10	[NA]
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	<1	116%
Toluene	µg/L	<1	<1	81	<1	117%
Ethylbenzene	µg/L	<1	<1	<1	<1	121%
m+p-xylene	µg/L	<2	<2	<2	<2	114%
o-xylene	µg/L	<1	<1	<1	<1	117%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	110	100	110	98	110
Surrogate Toluene-d8	%	96	91	97	96	102
Surrogate 4-Bromofluorobenzene	%	104	102	105	104	101

vTRH(C6-C10)/BTEXN in Water

Our Reference		373722-6
Your Reference	UNITS	TB/20250220
Date Sampled		20/02/2025
Type of sample		Water
Date extracted	-	24/02/2025
Date analysed	-	25/02/2025
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	%	80
Surrogate Toluene-d8	%	97
Surrogate 4-Bromofluorobenzene	%	103

svTRH (C10-C40) in Water					
Our Reference		373722-1	373722-2	373722-3	373722-4
Your Reference	UNITS	BH101	BH102	BH103	GWD1/20250220
Date Sampled		20/02/2025	20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	26/02/2025	26/02/2025	26/02/2025	26/02/2025
Date analysed	-	27/02/2025	27/02/2025	27/02/2025	27/02/2025
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	120	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	140	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50	260	<50
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	120	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	120	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	180	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50	300	<50
Surrogate o-Terphenyl	%	94	106	104	88

PAHs in Water					
Our Reference		373722-1	373722-2	373722-3	373722-4
Your Reference	UNITS	BH101	BH102	BH103	GWD1/20250220
Date Sampled		20/02/2025	20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	26/02/2025	26/02/2025	26/02/2025	26/02/2025
Date analysed	-	28/02/2025	28/02/2025	27/02/2025	27/02/2025
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 <i>p</i> -Terphenyl-d14	%	85	91	91	90

OCPs in Water - Trace Level			
Our Reference		373722-1	373722-2
Your Reference	UNITS	BH101	BH102
Date Sampled		20/02/2025	20/02/2025
Type of sample		Water	Water
Date extracted	-	26/02/2025	26/02/2025
Date analysed	-	28/02/2025	28/02/2025
alpha-BHC	µg/L	<0.001	<0.001
HCB	µg/L	<0.001	<0.001
beta-BHC	µg/L	<0.001	<0.001
gamma-BHC	µg/L	<0.001	<0.001
Heptachlor	µg/L	<0.001	<0.001
delta-BHC	µg/L	<0.001	<0.001
Aldrin	µg/L	<0.001	<0.001
Heptachlor Epoxide	µg/L	<0.001	<0.001
gamma-Chlordane	µg/L	<0.001	<0.001
alpha-Chlordane	µg/L	<0.001	<0.001
Endosulfan I	µg/L	<0.002	<0.002
pp-DDE	µg/L	<0.001	<0.001
Dieldrin	µg/L	<0.001	<0.001
Endrin	µg/L	<0.001	<0.001
Endosulfan II	µg/L	<0.002	<0.002
pp-DDD	µg/L	<0.001	<0.001
Endrin Aldehyde	µg/L	<0.001	<0.001
pp-DDT	µg/L	<0.001	<0.001
Endosulfan Sulphate	µg/L	<0.001	<0.001
Methoxychlor	µg/L	<0.001	<0.001
Surrogate 4-Chloro-3-NBTF	%	88	84

OP in water LL ANZECCF/ADWG			
Our Reference		373722-1	373722-2
Your Reference	UNITS	BH101	BH102
Date Sampled		20/02/2025	20/02/2025
Type of sample		Water	Water
Date extracted	-	26/02/2025	26/02/2025
Date analysed	-	28/02/2025	28/02/2025
Dichlorvos	µg/L	<0.05	<0.05
Mevinphos	µg/L	<0.05	<0.05
Phorate	µg/L	<0.05	<0.05
Dimethoate	µg/L	<0.1	<0.1
Diazinon	µg/L	<0.01	<0.01
Disulfoton	µg/L	<0.05	<0.05
Chlorpyrifos-methyl	µg/L	<0.05	<0.05
Parathion-Methyl	µg/L	<0.05	<0.05
Ronnel	µg/L	<0.05	<0.05
Fenitrothion	µg/L	<0.05	<0.05
Malathion	µg/L	<0.05	<0.05
Chlorpyrifos	µg/L	<0.009	<0.009
Fenthion	µg/L	<0.05	<0.05
Parathion	µg/L	<0.004	<0.004
Bromophos ethyl	µg/L	<0.05	<0.05
Methidathion	µg/L	<0.05	<0.05
Fenamiphos	µg/L	<0.05	<0.05
Ethion	µg/L	<0.05	<0.05
Phosalone	µg/L	<0.05	<0.05
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02
Coumaphos	µg/L	<0.05	<0.05
Surrogate 4-Chloro-3-NBTF	%	88	84

PCBs in Water - Trace Level			
Our Reference		373722-1	373722-2
Your Reference	UNITS	BH101	BH102
Date Sampled		20/02/2025	20/02/2025
Type of sample		Water	Water
Date extracted	-	26/02/2025	26/02/2025
Date analysed	-	28/02/2025	28/02/2025
Aroclor 1016	µg/L	<0.01	<0.01
Aroclor 1221	µg/L	<0.01	<0.01
Aroclor 1232	µg/L	<0.01	<0.01
Aroclor 1242	µg/L	<0.01	<0.01
Aroclor 1248	µg/L	<0.01	<0.01
Aroclor 1254	µg/L	<0.01	<0.01
Aroclor 1260	µg/L	<0.01	<0.01
Surrogate 2-Fluorobiphenyl	%	84	87

Total Phenolics in Water					
Our Reference		373722-1	373722-2	373722-3	373722-4
Your Reference	UNITS	BH101	BH102	BH103	GWD1/20250220
Date Sampled		20/02/2025	20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	28/02/2025	28/02/2025	28/02/2025	28/02/2025
Date analysed	-	28/02/2025	28/02/2025	28/02/2025	28/02/2025
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05	<0.05

HM in water - total					
Our Reference		373722-1	373722-2	373722-3	373722-4
Your Reference	UNITS	BH101	BH102	BH103	GWD1/20250220
Date Sampled		20/02/2025	20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water	Water
Date prepared	-	27/02/2025	27/02/2025	27/02/2025	27/02/2025
Date analysed	-	27/02/2025	27/02/2025	27/02/2025	27/02/2025
Arsenic-Total	µg/L	3	14	11	1
Cadmium-Total	µg/L	<0.1	0.9	0.2	<0.1
Chromium-Total	µg/L	19	98	93	4
Copper-Total	µg/L	30	460	220	10
Iron-Total	µg/L	4,300	41,000	31,000	1,200
Mercury-Total	µg/L	<0.05	2.5	<0.05	<0.05
Manganese-Total	µg/L	37	400	560	27
Nickel-Total	µg/L	30	72	170	31
Lead-Total	µg/L	24	720	66	15
Zinc-Total	µg/L	56	1,100	250	25

HM in water - dissolved			
Our Reference		373722-1	373722-2
Your Reference	UNITS	BH101	BH102
Date Sampled		20/02/2025	20/02/2025
Type of sample		Water	Water
Date prepared	-	26/02/2025	26/02/2025
Date analysed	-	26/02/2025	26/02/2025
Arsenic-Dissolved	µg/L	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	2	<1
Copper-Dissolved	µg/L	8	2
Iron-Dissolved	µg/L	860	730
Mercury-Dissolved	µg/L	<0.05	<0.05
Manganese-Dissolved	µg/L	25	110
Nickel-Dissolved	µg/L	28	20
Lead-Dissolved	µg/L	9	<1
Zinc-Dissolved	µg/L	23	72

Miscellaneous Inorganics				
Our Reference		373722-1	373722-2	373722-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water
Date prepared	-	24/02/2025	24/02/2025	24/02/2025
Date analysed	-	24/02/2025	24/02/2025	24/02/2025
pH	pH Units	4.5	5.9	INS
Electrical Conductivity	µS/cm	640	830	INS
Turbidity	NTU	610	NT	INS
Total Dissolved Solids (grav)	mg/L	420	440	INS
Total Suspended Solids	mg/L	940	5,800	INS
Oil & Grease (LLE)	mg/L	<5	7	INS
Ammonia as N in water	mg/L	0.44	0.095	INS
Nitrate as N in water	mg/L	13	13	INS
Nitrite as N in water	mg/L	0.016	0.17	INS
NOx as N in water	mg/L	13	13	INS
Total Nitrogen in water	mg/L	21	22	INS
TKN in water	mg/L	8.2	9.3	INS
Organic Nitrogen as N	mg/L	7.7	9.2	INS

Ion Balance				
Our Reference		373722-1	373722-2	373722-3
Your Reference	UNITS	BH101	BH102	BH103
Date Sampled		20/02/2025	20/02/2025	20/02/2025
Type of sample		Water	Water	Water
Date prepared	-	24/02/2025	24/02/2025	24/02/2025
Date analysed	-	24/02/2025	24/02/2025	24/02/2025
Calcium - Dissolved	mg/L	29	87	47
Potassium - Dissolved	mg/L	28	30	10
Sodium - Dissolved	mg/L	32	25	88
Magnesium - Dissolved	mg/L	8.8	10	5.4
Hardness (calc) equivalent CaCO ₃	mg/L	110	260	140
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5	INS
Bicarbonate Alkalinity as CaCO ₃	mg/L	8	210	INS
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5	INS
Total Alkalinity as CaCO ₃	mg/L	8	210	INS
Sulphate, SO ₄	mg/L	160	140	INS
Chloride, Cl	mg/L	31	25	INS
Ionic Balance	%	0	-5.0	[NT]

PFAS in Water TRACE Short			
Our Reference		373722-1	373722-2
Your Reference	UNITS	BH101	BH102
Date Sampled		20/02/2025	20/02/2025
Type of sample		Water	Water
Date prepared	-	25/02/2025	25/02/2025
Date analysed	-	25/02/2025	25/02/2025
Perfluorobutanesulfonic acid	µg/L	0.011	0.0069
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0090	0.0051
Perfluorooctanesulfonic acid PFOS	µg/L	0.028	0.060
Perfluorooctanoic acid PFOA	µg/L	0.0098	0.010
6:2 FTS	µg/L	0.016	0.051
8:2 FTS	µg/L	<0.0004	<0.0004
Surrogate ¹³ C ₈ PFOS	%	113	121
Surrogate ¹³ C ₂ PFOA	%	90	86
Extracted ISTD ¹³ C ₃ PFBS	%	56	61
Extracted ISTD ¹⁸ O ₂ PFHxS	%	73	78
Extracted ISTD ¹³ C ₄ PFOS	%	83	86
Extracted ISTD ¹³ C ₄ PFOA	%	79	84
Extracted ISTD ¹³ C ₂ 6:2FTS	%	121	183
Extracted ISTD ¹³ C ₂ 8:2FTS	%	154	161
Total Positive PFHxS & PFOS	µg/L	0.037	0.066
Total Positive PFOS & PFOA	µg/L	0.037	0.071
Total Positive PFAS	µg/L	0.074	0.13

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-003	Oil & Grease - determine gravimetrically following extraction with Hexane, in accordance with APHA latest edition, 5520-B.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- $\text{TDS} = \text{EC} * 0.6$
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-022	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130-B.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES. Total Phosphate determined stoichiometrically from Phosphorus (assumed to be present as Phosphate). Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
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-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS.
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. 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)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

Method ID	Methodology Summary
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: VOCs in water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date Extracted	-			24/02/2025	1	24/02/2025	26/02/2025		24/02/2025	[NT]
Date Analysed	-			25/02/2025	1	25/02/2025	27/02/2025		25/02/2025	[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	100	[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	101	[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	97	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	110	[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	104	[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	109	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	101	[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	108	[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	104	[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	107	[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	108	[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	109	[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-W2	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[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	100	1	110	101	9	81	[NT]
Surrogate Toluene-d8	%		Org-023	96	1	96	91	5	100	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	102	1	104	102	2	99	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			24/02/2025	1	24/02/2025	26/02/2025		24/02/2025	[NT]
Date analysed	-			25/02/2025	1	25/02/2025	27/02/2025		25/02/2025	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	1	<10	<10	0	108	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	1	<10	<10	0	108	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	104	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	109	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	100	1	110	101	9	81	[NT]
Surrogate Toluene-d8	%		Org-023	96	1	96	91	5	100	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	102	1	104	102	2	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			27/02/2025	[NT]	[NT]	[NT]	[NT]	27/02/2025	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-020	104	[NT]	[NT]	[NT]	[NT]	135	[NT]

QUALITY CONTROL: PAHs in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	70	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	71	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	69	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	65	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	81	[NT]	[NT]	[NT]	[NT]	74	[NT]

QUALITY CONTROL: OCPs in Water - Trace Level						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
alpha-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	80	[NT]
HCB	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	70	[NT]
gamma-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	70	[NT]
delta-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	77	[NT]
Heptachlor Epoxide	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	76	[NT]
gamma-Chlordane	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.002	Org-022/025	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	69	[NT]
Dieldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	79	[NT]
Endrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	60	[NT]
Endosulfan II	µg/L	0.002	Org-022/025	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	75	[NT]
Endrin Aldehyde	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	71	[NT]
Endosulfan Sulphate	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methoxychlor	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	78	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
Dichlorvos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	78	[NT]
Mevinphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyrifos-methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion-Methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	77	[NT]
Fenitrothion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	105	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	84	[NT]
Chlorpyrifos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	82	[NT]
Fenthion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	µg/L	0.004	Org-022/025	<0.004	[NT]	[NT]	[NT]	[NT]	94	[NT]
Bromophos ethyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	79	[NT]
Phosalone	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Coumaphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	78	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: PCBs in Water - Trace Level					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
Aroclor 1016	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	118	[NT]
Aroclor 1260	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	86	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
Date analysed	-			28/02/2025	[NT]	[NT]	[NT]	[NT]	28/02/2025	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			27/02/2025	3	27/02/2025	27/02/2025		27/02/2025	[NT]
Date analysed	-			27/02/2025	3	27/02/2025	27/02/2025		27/02/2025	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	3	11	[NT]		99	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	3	0.2	[NT]		102	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	3	93	[NT]		101	[NT]
Copper-Total	µg/L	1	Metals-022	<1	3	220	[NT]		106	[NT]
Iron-Total	µg/L	10	Metals-022	<10	3	31000	[NT]		98	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	3	<0.05	<0.05	0	102	[NT]
Manganese-Total	µg/L	5	Metals-022	<5	3	560	[NT]		96	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	3	170	[NT]		101	[NT]
Lead-Total	µg/L	1	Metals-022	<1	3	66	[NT]		114	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	3	250	[NT]		101	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date prepared	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Date analysed	-			26/02/2025	[NT]	[NT]	[NT]	[NT]	26/02/2025	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	89	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	117	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	[NT]	[NT]	[NT]	[NT]	93	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/02/2025	2	24/02/2025	24/02/2025		24/02/2025	[NT]
Date analysed	-			24/02/2025	2	24/02/2025	24/02/2025		24/02/2025	[NT]
pH	pH Units		Inorg-001	[NT]	2	5.9	[NT]		101	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	2	830	[NT]		100	[NT]
Turbidity	NTU	0.1	Inorg-022	<0.1	2	NT	[NT]		103	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	2	440	[NT]		103	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	2	5800	5500	5	97	[NT]
Oil & Grease (LLE)	mg/L	5	Inorg-003	<5	2	7	[NT]		89	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	2	0.095	[NT]		88	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	2	13	[NT]		96	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	2	0.17	[NT]		96	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	2	13	[NT]		96	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	2	22	23	4	118	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	2	9.3	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	2	9.2	[NT]		[NT]	[NT]

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/02/2025	[NT]	[NT]	[NT]	[NT]	24/02/2025	[NT]
Date analysed	-			24/02/2025	[NT]	[NT]	[NT]	[NT]	24/02/2025	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	88	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: PFAS in Water TRACE Short					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/02/2025	[NT]	[NT]	[NT]	[NT]	25/02/2025	[NT]
Date analysed	-			25/02/2025	[NT]	[NT]	[NT]	[NT]	25/02/2025	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	104	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	95	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	108	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	104	[NT]
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	101	[NT]
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	113	[NT]
Surrogate ¹³ C ₈ PFOS	%		Org-029	95	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate ¹³ C ₂ PFOA	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	101	[NT]
Extracted ISTD ¹³ C ₃ PFBS	%		Org-029	75	[NT]	[NT]	[NT]	[NT]	75	[NT]
Extracted ISTD ¹⁸ O ₂ PFHxS	%		Org-029	81	[NT]	[NT]	[NT]	[NT]	81	[NT]
Extracted ISTD ¹³ C ₄ PFOS	%		Org-029	79	[NT]	[NT]	[NT]	[NT]	73	[NT]
Extracted ISTD ¹³ C ₄ PFOA	%		Org-029	91	[NT]	[NT]	[NT]	[NT]	87	[NT]
Extracted ISTD ¹³ C ₂ 6:2FTS	%		Org-029	84	[NT]	[NT]	[NT]	[NT]	114	[NT]
Extracted ISTD ¹³ C ₂ 8:2FTS	%		Org-029	81	[NT]	[NT]	[NT]	[NT]	118	[NT]

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

VOC vials have headspace

Turbidity: Sample 2 could not be analysed due to the high concentration of solid matter.

For PFAS Extracted Internal Standards denoted with # or outside the 50-150% acceptance range, the respective target analyte results may be unaffected, in other circumstances the PQL has been raised to accommodate the outlier(s).

Project No: 231957.01		Suburb: Ultimo		To: Envirolab Services	
Project Manager: Nerilee Edwards		Order Number:		Sampler: SP	
Email: Nerilee.Edwards@douglaspartners.com.au; Setareh.pourkazemi@douglaspartners.com.au				Attn: Sample Receipt	
Turnaround time: ☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com.au	
Prior Storage: ☒ Fridge ☐ Freezer ☐ Esky ☐ Shelf		Do samples contain 'potential' HBM? ☒ No ☐ Yes YES, then handle, transport and store in accordance with FPM HAZID)			

Lab ID	Sample ID			Date Sampled	Sample Type S - soil W - water M - Material	Container Type G - glass P - plastic	Analytes														Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To				CW008_T	CW004_T	Dissolved metals	BTEX, TRH	PFAS	VOC	Anions and cations	pH, EC, turbidity, TDS, TSS	nitrogen suite	Hardness	oil and grease				
1	BH101	-	-	20/02/25	W	G/P	x		x		x	x	x	x	x	x	x			PFAS, trace level, short suite. OCP, OPP, PCB trace level PAH low level Metals: pls see below Sample 103 - pls analyse analytes from left to right until you run out of sample	
2	BH102	-	-	20/02/25	W	G/P	x		x		x	x	x	x	x	x	x				
3	BH103	-	-	20/02/25	W	G/P		x				x	x	x	x	x	x				
4	GWD1/20250220	-	-	20/02/25	W	G/P		x													
5	TS/20250220	-	-	20/02/25	W	Vials				BTEX											
6	TB/20250220	-	-	20/02/25	W	Vials				x											

Metals to analyse: As, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Zn		LAB RECEIPT	
Number of samples in container:		Transported to laboratory by: Courier	
Send results to: Douglas Partners Pty Ltd		Lab Ref. No: 373722	
Address: 96 Hermitage Road, West Ryde NSW 2114		Received by: Kathy Wayne	
Relinquished by: SP		Date & Time: 21/02/25 1400	
Phone: (02) 9809 0666		Signed: [Signature]	
Date: 21/02/2025		Signed: Setareh Pourkazemi	

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 5200

Job No: 373722

Date Received: 21/02/25
Time Received: 1400
Received By: KW
Temp: Cool/Ambient
Cooling: Ice/icepack 12°C
Security: Intact/Broken/None

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Nerilee Edwards

Sample Login Details

Your reference	231957.01, Ultimo
Envirolab Reference	373722
Date Sample Received	21/02/2025
Date Instructions Received	21/02/2025
Date Results Expected to be Reported	28/02/2025

Sample Condition

Samples received in appropriate condition for analysis	VOC vials have headspace
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	12
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Please contact the laboratory within 24 hours if you wish to cancel the aforementioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

Aileen Hie

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: ahie@envirolab.com.au

Jacinta Hurst

Phone: 02 9910 6200
Fax: 02 9910 6201
Email: jhurst@envirolab.com.au

Analysis Underway, details on the following page:



1107

Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	OCPs in Water - Trace Level	OP in water LL ANZECCF/ADWG	PCBs in Water - Trace Level	Total Phenolics in Water	HM in water - total	HM in water - dissolved	pH	Electrical Conductivity	Turbidity	Total Dissolved Solids(grav)	Total Suspended Solids	Oil & Grease (LLE)	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	NOx as N in water	Total Nitrogen in water	TKN in water	Organic Nitrogen as N	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness (calc) equivalent CaCO3	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance	PFAS in Water TRACE Short		
BH101	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH102	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH103	✓	✓	✓	✓				✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
GWD1/20250220		✓	✓	✓				✓	✓																													
TS/20250220		✓																																				
TB/20250220		✓																																				

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.

Table J4 : Summary of Laboratory Results of Groundwater Analysis

		Metals - Total										Metals - Dissolved										TRH			
		Total Arsenic	Cadmium	Total Chromium	Copper	Iron	Lead	Manganese	Mercury (inorganic)	Nickel	Zinc	Total Arsenic	Cadmium	Total Chromium	Copper	Iron	Lead	Manganese	Mercury (inorganic)	Nickel	Zinc	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)
	PQL	1	0.1	1	1	10	1	5	0.05	1	1	1	0.1	1	1	10	1	5	0.05	1	1	10	50	100	100
NHMRC (2012) Recreation		100	20		20,000		100	5,000	10	200		100	20		20,000		100	5,000	10	200					
ANZG (2018) 95% LOP Marine			5.5	4.4	1.3		4.4	80	0.1	70	8		5.5	4.4	1.3		4.4	80	0.1	70	8				
HEPA (2018) 99% LOP Marine																									
HEPA (2018) 95% LOP Marine																									
NEPC (2013) HSL 2-4m																					6,000	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	
BH101	20/02/25	3	<0.1	19	30	4,300	24	37	<0.05	30	56	<1	<0.1	2	8	860	9	25	<0.05	28	23	<10	<50	<100	<100
GWD1/20250220	20/02/25	1	<0.1	4	10	1,200	15	27	<0.05	31	25	-	-	-	-	-	-	-	-	-	-	<10	<50	<100	<100
BH102	20/02/25	14	0.9	98	460	41,000	720	400	2.5	72	1,100	<1	<0.1	<1	2	730	<1	110	<0.05	20	72	<10	<50	<100	<100
BH103	20/02/25	11	0.2	93	220	31,000	66	560	<0.05	170	250	-	-	-	-	-	-	-	-	-	-	<10	120	180	<100

Notes:

- No criterion / not defined / not tested / not applicable
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- NL Not limiting
- PQL Practical quantitation limit

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 Sand 2-4m

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NHMRC (2008) Guidelines for Managing Risk in Recreational Water

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

		BTEX						PAH																				
		Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Naphthalene	Benzo(a)pyrene (BaP)	Benzo(b,j+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	Sum of detected PAH	DDE	DDT	DDD	Aldrin	Dieldrin
	PQL	1	1	1	1	2	1	0.1	0.1	0.1	0.1	1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001
NHMRC (2012) Recreation		10	8,000	3,000			6,000						0.1												90			
ANZG (2018) 95% LOP Marine		700	180	80		75				0.01		70	0.1					1				0.6			0.0004		0.003	
HEPA (2018) 99% LOP Marine																												
HEPA (2018) 95% LOP Marine																												
NEPC (2013) HSL 2-4m		5,000	NL	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
BH101	20/02/25	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.001
GWDI/20250220	20/02/25	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
BH102	20/02/25	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.001
BH103	20/02/25	<1	81	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-

Notes:

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

		OCP																	OPP									
		Aldrin + Dieldrin (calculated)	alpha-chlordane	gamma-Chlordane	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Methoxychlor	alpha-BHC	beta-BHC	delta-BHC	Lindane	Sum of detected OCP	Azinphos methyl (Guthion)	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Romel (fenchlorphos)	
	PQL	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.02	0.05	0.009	0.05	0.01	0.05	0.1	0.05	0.05	
NHMRC (2012) Recreation		3								3							100		300	100	100		40	50	70	40		
ANZG (2018) 95% LOP Marine								0.004		0.0004		0.1	0.004				0.007				0.009							
HEPA (2018) 99% LOP Marine																												
HEPA (2018) 95% LOP Marine																												
NEPC (2013) HSL 2-4m																												
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	
BH101	20/02/25	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	
GWD1/20250220	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH102	20/02/25	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	
BH103	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

										PCB																	
		Fenitrothion	Fenthion	Malathion	Parathion	Parathion-methyl	Methidathion	Fenamiphos	Sum of detected OPP	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Aroclor 1260	Sum of detected PCB	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene (PCE)	1,1,2-trichloroethane	1,1,2-trichloroethylene	1,1-dichloroethane	1,1-Dichloroethene (DCE)	1,1-dichloropropene	1,2,3-trichlorobenzene
	PQL	0.05	0.05	0.05	0.004	0.05	0.05	0.05	0.004	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1	1	1	1	1	1	1	1	1	1
NHMRC (2012) Recreation		70	70	700	200	7	60	5													500				300		
ANZG (2018) 95% LOP Marine		<u>0.001</u>																	270	400	70	1,900	330		700		
HEPA (2018) 99% LOP Marine																											
HEPA (2018) 95% LOP Marine																											
NEPC (2013) HSL 2-4m																											
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
BH101	20/02/25	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
GWD1/20250220	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	20/02/25	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH103	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

		VOC (excluding BTEX)																									
		1,2,3- trichloropropane	1,2,4- trichlorobenzene	1,2,4-trimethyl benzene	1,2-dibromo-3- chloropropane	1,2- dichlorobenzene	1,2-dichloroethane	1,2- dichloropropane	1,3,5-trimethyl benzene	1,3- dichlorobenzene	1,3- dichloropropane	1,4- dichlorobenzene	2,2- dichloropropane	2-chlorotoluene	4-chlorotoluene	4-isopropyl toluene	Bromobenzene	Bromochloromet hane	Bromodichlorom ethane	Bromodform	carbon tetrachloride	Chloroethane	Vinyl Chloride	Chloroform	Chloromethane	cis-1,2- dichloroethene	cis-1,3- dichloropropene
	PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	10	1	10	1	1
NHMRC (2012) Recreation						15,000	30					400									30		3	2500			
ANZG (2018) 95% LOP Marine			20				1,900	900			1,100										240		100	770			
HEPA (2018) 99% LOP Marine																											
HEPA (2018) 95% LOP Marine																											
NEPC (2013) HSL 2-4m																											
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
BH101	20/02/25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	1	<10	<1	<1
GWD1/20250220	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	20/02/25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	2	<10	<1	<1
BH103	20/02/25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<10	<10	7	<10	<1	<1

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

																				PFAS						
		Isopropylbenzene (cumene)	Cyclohexane	dibromochlorome thane	Dibromomethane	Dichlorodifluorom ethane	1,2- dibromoethane	hexachlorobutadi ene	Bromomethane	Monochlorobenze ne	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene	trans-1,2- dichloroethene	trans-1,3- dichloropropene	Trichlorofluorome thane	Sum of detected VOC	PFOS	PFOA	PFHxS	Perfluorobutanes ulfonic acid	6:2 FTS	8:2 FTS	Sum of detected PFAS
	PQL	1	1	1	1	10	1	1	10	1	1	1	1	1	1	1	1	10	1	0.0002	0.0002	0.0002	0.0004	0.0004	0.0004	0.0002
NHMRC (2012) Recreation							10	7	10	3,000				300							10					
ANZG (2018) 95% LOP Marine		30								55																
HEPA (2018) 99% LOP Marine																				0.00023	19					
HEPA (2018) 95% LOP Marine																				0.13	220					
NEPC (2013) HSL 2-4m																										
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
BH101	20/02/25	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	1	0.028	0.0098	0.009	0.011	0.016	<0.0004	0.074
GWDI/20250220	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	20/02/25	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	2	0.06	0.01	0.0051	0.0069	0.051	<0.0004	0.133
BH103	20/02/25	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	8	-	-	-	-	-	-	-

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Table J4 : Summary of Laboratory Results of Groundwater Analysis

		Nutrients							Physical Parameters						Anions & Cations						Anions & Cations - Dissolved			
		Nitrogen	Ammonia as N	TKN in water	Nitrate as N	Nitrite as N	NOx as N	Organic Nitrogen as N	Total dissolved solids	pH	Electrical Conductivity	Total Suspended Solids (TSS)	Oil & Crease	Turbidity	Bicarbonate Alkalinity as CaCO3	Chloride	Hydroxide Alkalinity (OH-) as CaCO3	Ionic Balance	Sulphate	Total Alkalinity as CaCO3	Calcium	Magnesium	Potassium	Sodium
	PQL	100	5	100	5	5	5	200	5,000	-	1	5,000	5,000	0.1	5,000	1000	5,000		1000	5,000	500	500	500	500
NHMRC (2012) Recreation					500,000	30,000																		
ANZG (2018) 95% LOP Marine			910																					
HEPA (2018) 99% LOP Marine																								
HEPA (2018) 95% LOP Marine																								
NEPC (2013) HSL 2-4m																								
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pH Units	µS/cm	µg/L	µg/L	ntu	µg/L	µg/L	µg/L	%	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH101	20/02/25	21,000	440	8,200	13,000	16	13,000	7,700	420,000	4.5	640	940,000	<5000	610	8,000	31,000	<5000	-	160,000	8,000	29,000	8,800	28,000	32,000
GWD1/20250220	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	20/02/25	22,000	95	9,300	13,000	170	13,000	9,200	440,000	5.9	830	5,800,000	7,000	-	210,000	25,000	<5000	-5	140,000	210,000	87,000	10,000	30,000	25,000
BH103	20/02/25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47,000	5,400	10,000	88,000

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Appendix G

Water NSW Fact Sheet

Construction dewatering

Information for councils and applicants



This fact sheet provides local government authorities and applicants with information about construction dewatering and which approvals may be required to authorise dewatering. It also helps those seeking development consent to determine whether a development application is an integrated development application because of the need to obtain approvals relating to dewatering.

What is construction dewatering?

Construction work that requires excavation (such as basements, tunnels and trenches) can often encounter groundwater, particularly where the groundwater table is high or the excavation is particularly deep. Where construction activities will interfere with groundwater aquifers, the groundwater will either build up on the construction site (and potentially adjoining land) or will need to be extracted from the water table. In either case, the groundwater will need to be removed (by bore, pump or other means) - this is referred to as **dewatering**.

The removal of the groundwater from its water source and the taking/using of water (even if the take and use is for disposal) may require approval under the *Water Management Act 2000* (WMA).

Where a development application is lodged for development which requires approvals under the WMA, the development will be an integrated development and local government authorities will typically manage the WMA approval process in conjunction with WaterNSW.

All construction activities that will impact on groundwater aquifers should be referred to WaterNSW as part of the integrated development process to streamline the assessment processes. From 1 January 2020, this should be done via the NSW Planning Portal at <https://www.planningportal.nsw.gov.au>.

If the need for WMA approvals only becomes apparent following development consent, applicants should be referred directly to WaterNSW.

What approvals are likely to be required to dewater a construction site?

The following approvals are likely required under the WMA to dewater a site:

- 1. Water supply work approval** to construct and use the work(s) required to remove, transport, store, and dispose of the water from a groundwater source, e.g. pumps, bores drainage works.
- 2. Water access licence (WAL)** which will authorise a licence holder to take water from a specific groundwater source. WALs usually have an allocation of water attached to them which determines the amount of water that can be taken. Usually, this is in the form of units. The Minister for Water determines annually the amount of water (in megalitres (ML)) which a unit represents for a year. Usually, 1 unit represents 1 ML.

Typically, a WAL has a NIL allocation when it is first issued. A WAL and/or units for a WAL, or the annual allocations referable to a particular unit, can be purchased in the market for the relevant water source. Importantly, a WAL is not an approval which is part of the integrated development process. It must be addressed separately.
- 3. Water use approval** to use or dispose of the water taken from the groundwater source.

Construction dewatering

Information for councils and applicants

Both work approvals and water use approvals under the WMA trigger the integrated development process. When a development application (DA) requires either of these approvals, the DA must be referred to WaterNSW.

Some particular dewatering activities may be exempt from the above requirements. There are certain requirements that the applicant must meet and comply with in order to take advantage of the exemptions. Refer to the [Exemptions fact sheet](#) for more information.

Approvals under the WMA to construct and use work(s) to remove groundwater require a dewatering management plan.

What happens once an application is submitted to WaterNSW?

WaterNSW refers all construction dewatering applications to the Department of Planning, Industry and Environment (DPIE).

Once received, DPIE undertakes a hydrogeological assessment of the application and provides a hydrogeological report to WaterNSW.

WaterNSW considers the hydrogeological report as part of the assessment process to assist in determining whether the WMA approvals should be granted.

Information required for DPIE to undertake a hydrogeological assessment

- Geotechnical investigation report describing the results of intrusive investigations at the site
- Survey plan of the site
- Architectural plan illustrating accurate design dimensions of the proposed basement and sections (oriented approximately at right angles) illustrating the design depth of the proposed basement(s).
- Environmental site assessment report identifying the contamination status of the property and the general quality characteristics of the groundwater beneath the site.
- Acid sulfate soils assessment and management report identifying the nature, extent and management of acid sulfate soils (where present).

If additional information is required, WaterNSW will contact the applicant directly.

General terms of approvals

Once WaterNSW has received the hydrogeological report for the application and considered all relevant matters, it will determine whether the WMA approvals can be granted.

If the approvals are granted for integrated development, WaterNSW will provide the local council with general terms of approval (GTAs). View the [General terms of approval fact sheet](#) for more information.

If the local council proposes to grant development consent for the DA, then it must include the WaterNSW GTAs as conditions of the development consent.

The applicant must still separately apply to WaterNSW for the relevant WMA approvals for the particular activity. However, the WMA approvals will be required to be granted in accordance with the development consent.

What if more time is needed to complete dewatering?

WaterNSW typically grants WMA approvals for dewatering activities for a period of two years. If there are issues completing dewatering within two years, the applicant may submit an application to extend the approval.

If an extension is warranted, WaterNSW will generally extend the approval for a further 12 months. The applicant will be required to submit an interim report to confirm the construction activity is underway. The interim report requires the same information as the completion report. Please refer to the [Completion report fact sheet](#) for more information.

Approvals must usually be extended before the expiry date of the original approval. Approvals which have expired without extension may be referred to NRAR for investigation.

More information

Contact our Customer Service team on [1300 662 077](tel:1300662077) or email Customer.Helpdesk@waterNSW.com.au

Disclaimer:

This fact sheet is provided for general information purposes only and may not cover the precise circumstances of your development. It is only relevant to the particular matters identified in this fact sheet. There may be other processes and relevant fact sheets that are also relevant to your development. Links to all construction dewatering related fact sheets may be found at waterNSW.com.au/dewatering. This fact sheet is not legal advice and should not be relied upon as such. Interested persons should obtain their own advice. This fact sheet does not represent the views of any council or the Department of Planning, Industry and Environment or Natural Resources Access Regulator. This fact sheet represents an interim position and may be updated at any time. Please check the WaterNSW website for the current version. WaterNSW is not liable for consequences of actions taken in reliance of information provided or omitted from this document.