

Groundwater Impact Assessment

Proposed Mixed Use Development

402-420 Pacific Hwy, Crows Nest NSW

Prepared for Prosper Atrium Pty Ltd

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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

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Groundwater Impact Assessment Proposed Mixed Use Development 402-420 Pacific Hwy, Crows Nest NSW

1. Introduction

1.1 Purpose of this report

This report prepared by Douglas Partners Pty Ltd (Douglas) outlines a Groundwater Impact Assessment (GIA) for the proposed mixed-use development at 402-420 Pacific Hwy, Crows Nest NSW (the site). The work was undertaken in accordance with Douglas' proposal 236315.00.P.001.Rev0 dated 11 June 2025.

The purpose of this GIA is to support the submission of a State Significant Development Application (SSDA), addressing the assessment requirements specified in Section 1.3. Additionally, this document aims to assist in obtaining the necessary approvals for the disposal of extracted groundwater, where applicable.

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

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

- Geotechnical investigation report by Douglas (Reference 236315.00.R.002.Rev0, dated 21 October 2025) [Douglas2025a];
- Groundwater monitoring report by Douglas (Reference 236315.00.R.004.Rev0, dated 8 January 2026); and
- Preliminary (contamination) site investigation (Reference 236315.01.R.001.Rev2, dated 13 October 2025) [Douglas2025b].

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

- The proposed works will intercept the groundwater table;
- Groundwater levels on site have been observed between RL 72.7 mAHD and RL 81.9 mAHD;
- The depth of the proposed basement level 6 finished floor level is RL 69.2 mAHD;
- The basement is intended to be drained;
- The proposed method of dewatering is sump and pump; and
- The extracted groundwater is proposed to be disposed of via stormwater drainage system.

This GIA is intended as a preliminary document and will be superseded by a detailed GIA that includes water treatment and discharge schematics, monitoring plans, and triggers to be implemented during construction and operation for long term dewatering, when further details are available.

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

1.2 Regulatory framework and guidance

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

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

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

1.3 Assessment requirements

This GIA addresses the following relevant Secretary's Environmental Assessment Requirements (SEARs) set out in the in Table 1 below.

Table 1: SEARs Compliance Table

Assessment Requirement	Report Section / Response
12. Ground and Groundwater Conditions Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site and including soil erosion. Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies.	Refer to Douglas2025a Sections 4 to 10 Sections 4 to 11 of this report
13. Contamination and Remediation In accordance with Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and	Refer to Douglas (Douglas , 2025b)

Assessment Requirement	Report Section / Response
demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	

2. Proposed development

2.1 Proposed development and construction

It is understood that the proposed development involves demolition of the existing building and construction of a 39-storey mixed-use development with a six-level basement. Based on the architectural drawings prepared by fjcstudio (reference GBPH, Sheet No. 20B5), the lowest finished floor level (FFL) of the basement is at RL 69.2 m AHD (Australian Height Datum).

Based on the survey drawings provided, it is anticipated that the lowest basement level will require excavation to depths of approximately 19 m below existing surface levels with additional deepening likely required for the lift core.

2.2 Proposed dewatering and discharge methods

We expect that dewatering of the site will be achievable via conventional sumps and pumps and is expected to be redirected and discharged into council stormwater drains.

3. Site description

The site is located adjacent to Crows Nest Metro Station and is within the Crows Nest Transit Oriented Development (TOD) Accelerated Precinct which has been identified by the NSW Government to support housing delivery. The Crows Nest TOD Precinct has been subject of recent amendments to the planning controls which came into effect in November 2024.

The site comprises 2,127.7 m² of land at 402-420 Pacific Highway, Crows Nest (SP54033) within North Sydney LGA.

The site is currently developed with a four-storey mixed-use building. Vehicular access to existing basement car parking is from Oxley Street via the adjacent landholding with an easement granting right of carriageway. An overview of the site locality is provided in Figure 1.

The uses surrounding the site comprise:

- Crows Nest Metro Station to the east, which is known to be drained, has approval for over-station development up to 22-storeys of mixed-use and is the subject of a current SSD application for up to 27-storeys;
- An existing car wash facility and four-storey commercial building to the north which is subject of a proposal for a 52-storey mixed-use development being considered through the Housing Delivery Authority pathway as SSD with a concurrent rezoning;
- A three-storey commercial building to the northwest with potential for up to 16-storey commercial under the Crows Nest TOD controls;

- Three to five storey mixed-use and commercial buildings fronting Pacific Highway located to the south of the site which are the subject of a separate SSD application for a 40-storey mixed-use development; and
- Three-storey multi-dwelling housing to the west with potential for up to 12-storey residential buildings under the Crows Nest TOD controls.



Figure 1: Subject site (Source: Mecone Mosaic)

4. Hydrogeological setting

4.1 Topography and hydrology

The site is located toward the crest of a southwest facing hillside that grades down toward a gully feature that naturally drains into Berrys Creek located about 650 m to the southwest that ultimately leads into the Parramatta River.

4.2 Climate

Generally subtropical climate, characterised by mild winters and hot, humid summers. The average annual rainfall is approximately 1.2 m.

4.3 Geology

Reference to the Sydney 1:100,000 Geological Series Sheet indicates that the site is underlain by Ashfield Shale.

The Ashfield Shale overlies the Hawkesbury Sandstone and, in some areas, there is a transitional geological unit between these two main rock formations known as the Mittagong Formation.

The units typically comprise:

- Ashfield Shale – Black to dark grey shale, siltstone and laminite (finely interbedded sandstones and siltstones);
- Mittagong Formation – Interbedded shale, laminite and fine grained sandstone. This unit is a relatively thin formation that varies in thickness, typically between 3 m and 8 m thick, and is not always present; and
- Hawkesbury Sandstone – medium to coarse grained quartz sandstone, very minor shale and laminite lenses.

The geotechnical investigation (Douglas2025a) confirmed the mapping encountering Ashfield Shale and Mittagong Formation bedrock over Hawkesbury Sandstone.

4.4 Soil landscape

Reference to Sydney 1:100,000 Soil Landscape Sheet indicates the site is underlain by 'Blacktown' residual soils. The Blacktown residual soil landscape unit is characterised by gently undulating rises on Wianamatta Group Shales and Hawkesbury Shale. The map notes indicate that the ground slope grades usually less than 5 %.

4.5 Hydrogeology and groundwater source

Based on the hydrogeological setting, the site is assumed to be underlain by a groundwater system that includes minor fractured aquifers hosted by the underlying Ashfield Shale / Mittagong Formation / Hawkesbury Sandstone bedrock. These formations typically act as aquitards or aquicludes, although minor secondary permeability can occur where defects are present.

4.6 Groundwater receptors

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

A groundwater bore search of the WaterNSW database was conducted for any bores registered within a 500 m radius of the site. The search was undertaken to assess possible water levels and potential uses of groundwater in the vicinity of the site. There are no registered bores and available public groundwater data within a 500 m radius of the site.

4.7 Acid sulfate soils

Reference to the Environmental Planning Instrument (EPI) – Acid Sulfate Soils Mapping (SEED Web Map), published by the State Government of NSW and the NSW Department of Planning, Housing and Infrastructure, indicates that the site is not within an area mapped as being at risk of acid sulfate soil occurrence.

Given the elevation (RL 84.4 m AHD at the existing basement) and the known geology of the site, it is expected that acid sulfate soils are not present on the site.

4.8 Salinity

Reference to the Environmental Planning Instrument (EPI) – Salinity Mapping (SEED Web Map), published by the State Government of NSW and the NSW Department of Planning, Housing and Infrastructure, indicates the site is located outside the mapped area of salinity potential.

4.9 Contaminated sites

4.9.1 Registered Sites

A Preliminary Site (Contamination) Investigation with Limited Sampling (PSI) has been conducted by Douglas for the site (Douglas, 2025b). The key findings of the investigation are discussed below:

- A search of NSW EPA public registers and NSW EPA Per- and polyfluoroalkyl substances (PFAS) investigation program found no records for the site or adjacent properties;
- There are no records or notices pertaining to the site under Section 58 of the Contaminated Land Management Act (CLM Act), the site is not notified under Section 60 of the CLM Act and no licences listed under Section 308 of the Protection of the Environment Operations Act 1997 (POEO Act) pertaining to the site
- A Schedule 11 SafeWork NSW search was undertaken to identify records of historical or current storage of hazardous chemicals on site. The search did not locate any records pertaining to the site; and
- The Section 10.7 (2) & (5) planning certificate notes the following relevant information:
 - Council has no record of the subject land being identified on the NSW Fair Trading's Loose-Fill Asbestos Insulation Register; and
 - Council is not aware of the land being declared as significantly contaminated land, subject to a management order, subject to an approved voluntary management proposal, subject to an ongoing maintenance order, or subject to a site audit statement under the CLM Act 1997.

4.9.2 Potential contamination risks

Douglas (2025b) has been reviewed to assess the contamination risk relevant to dewatering for the project.

Generally, the risk of contamination was considered to be low, however the PSI identified the following potential sources and contaminants of potential concern (CoPC) relevant to the proposed dewatering:

- Fill associated with levelling, demolition of former buildings;
 - CoPC: heavy metals, per – and poly-fluoroalkyl substances (PFAS), total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene, total xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), phenols.
- Current and previous commercial land use, and surrounding commercial land use;
 - CoPC: metals, TRH, BTEX, PAH, phenols, PFAS, volatile organic compounds (VOC).

5. Investigation results

5.1 Geotechnical

A geotechnical investigation was undertaken by Douglas in 2025 (Douglas2025a). The test locations are shown in Drawing 1 (Appendix B).

The general strata encountered in the boreholes is summarised as follows:

Concrete:	Concrete slab thickness of 120 mm to 150 mm; overlying
Fill:	Sandy fill with some ironstone and igneous gravel encountered to depths ranging from 0.2 m to 0.3 m; overlying
Extremely Weathered Material:	High plasticity, hard silty clay with some ironstone and shale gravel to depths ranging from 0.6 m to 3.9 m; overlying
Very Low to Low Strength Siltstone:	Highly to moderately weathered, very low to low strength, highly fractured to fragmented siltstone with a significant number of joints with dipping angles typically between 40° and 85°, with frequent extremely weathered seams and occasional low to medium strength ironstone bands encountered to depths ranging from 8.4 m to 10.3 m. Possible shear zone (core loss) observed at depths of between 5.0 m and 7.0 m; overlying
Low to Medium and Medium Strength Siltstone and Sandstone	Slightly weathered to fresh, low to medium and medium strength interbedded and laminated siltstone and sandstone with occasional extremely weathered seams encountered to depths ranging from 15 m to 17.4 m with some lower and higher strength bands; overlying
Medium to High Strength Sandstone:	Fresh, slightly fractured to unbroken, medium to high strength sandstone encountered to termination depth in all boreholes.

5.2 Groundwater

Three groundwater wells were installed within three boreholes (BH01, BH02 and BH03) on the site. Groundwater results are summarised in subsequent sections.

Table 2 summarises the monitoring wells' attributes. Their location is shown on Drawing 1 (Appendix B). Details of well construction are shown on the borehole logs in Appendix C.

Table 2: Monitoring wells overview

Borehole	Surface RL (m AHD)	Response Zone ¹ Interval (m) [RL mAHD]	Response Zone ¹ Material	Description of fracturing
BH01	84.4	3.5 – 7.5 [80.9 – 76.9]	Siltstone	Highly weathered, highly fractured to fractured
BH02	84.4	7.4 – 14.5 [77 – 69.9]	Sandstone	Highly to slightly weathered, fractured to slightly fractured
BH03	84.4	10.8 – 18.0 [73.6 – 66.4]	Sandstone with interbedded Siltstone	Slightly weathered to fresh, slightly fractured to unbroken

Note: 1 – Comprises sand filter backfill and machine slotted PVC pipe

5.2.1 Groundwater levels

Groundwater was not observed during auger drilling of any of the geotechnical boreholes. The necessary introduction of water to the borehole while coring precluded any further groundwater observations during drilling.

Groundwater levels have been continuously recorded within the monitoring wells from 16 September 2025 to 5 January 2026 (three months) using data loggers.

Hydrographs of the groundwater data obtained from the dataloggers, which have been compensated for barometric pressure, are presented in Appendix D, together with manual groundwater level measurements and a plot of daily rainfall records obtained from Chatswood Bowling Club - Bureau of Meteorology Station 066011, <http://www.bom.gov.au>.

The manual (dipped) groundwater levels recorded are presented in Table 3.

Table 3: Manual groundwater measurement

Date	Measured Depth to Groundwater (m) [Groundwater Level (m AHD)]		
	BH01 (12/09/2025) ¹	BH02 (18/09/2025) ¹	BH03 (16/09/2025) ¹
26/09/2025	2.6 [81.9]	9.3 [75.1]	10.8 [73.6]
17/10/2025	3.2 [81.3]	9.9 [74.5]	11.1 [73.3]
5/01/2026	4.1 [80.3]	10.4 [74.0]	11.6 [72.8]

Maximum, minimum and average groundwater levels recorded by the dataloggers are presented in Table 4

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

Location ID	Datalogger Installation Date	Groundwater Level During Monitoring Period (RL m AHD)		
		Minimum ¹	Maximum	Average
BH01	16/09/2025	80.3 (4/01/2026)	81.9 (25/09/2025)	80.9
BH02	18/09/2025	73.9 (29/12/2025)	75.9 (18/09/2025)	74.8
BH03	16/09/2025	72.7 (29/20/2025)	74.7 (18/09/2025)	73.4

Note: ¹ does not consider the rising head test recharge

The results of the three-month monitoring indicate that groundwater levels within all monitoring wells have decreased slightly over time and were observed to be wholly within the bedrock profile. Impacts from rainfall on the groundwater levels are generally negligible, noting that it has been a relatively dry monitoring period.

The results also indicate that groundwater levels recorded within BH01 are significantly higher than those observed in BH02 and BH03. The elevated groundwater level in BH01 is interpreted to represent perched water stored within the upper highly fractured to fractured siltstone bedrock. Based on Douglas' experience in the area, the groundwater levels recorded in BH02 and BH03 are considered to be more representative of the regional groundwater conditions.

Noting the above, the direction of groundwater flow is toward the Crows Nest Metro Station box, which is known to be drained.

It should be noted that groundwater levels are transient and that fluctuations may occur in response to climatic and seasonal conditions. It is, however, not possible to accurately predict long term water levels and ongoing monitoring is recommended to assess fluctuations to inform the design.

5.2.2 Hydraulic conductivity

Rising head hydraulic conductivity tests were carried out at the monitoring wells on 16, 18 and 26 September and 17 October 2025. The tests were undertaken by removing a volume of water from the monitoring wells to lower the water level and measurement of the subsequent recovery rate.

Hydraulic conductivity tests were analysed using the Hvorslev (1951) solution for slug testing interpretation. Results are presented in Table 5. The detailed results of the tests are attached in Appendix E.

Table 5: Interpreted hydraulic conductivity results

Location ID	Screened Lithology	Interpreted k (m/s)
BH01	Highly weathered, highly fractured to fractured, very low strength Siltstone.	$1.4 - 2.1 \times 10^{-8}$
BH02	Slightly weathered, slightly fractured, medium strength with very low to low strength band Sandstone.	$1.4 - 2.6 \times 10^{-7}$
BH03	Slight weathered with highly to extremely weathered bands, slightly fractured, medium to high strength with very low to low strength bands Sandstone.	$4.4 - 8.4 \times 10^{-8}$
Geometric Mean		5.9×10^{-8}

The results of the rising head testing are consistent with ranges of values documented in the available literature for similar lithologies (e.g. Hoek & Bray 1981 and more recently Pells 2019) and Douglas' previous experience with similar materials.

5.2.3 Groundwater quality

Groundwater quality testing was undertaken as part of the geotechnical investigation (Douglas, 2025a) from two monitoring wells BH01 and BH03. The results provide an indication of baseline groundwater quality at the site and inform potential disposal options and management requirements (further discussed in Section 9.3).

Groundwater samples were collected and dispatched to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of physical parameters, major ions, metals, TRH, PAH, BTEX, phenols, OCP, OPP, PCB, VOC and PFAS.

For the purpose of this GIA, the results were assessed against the proposed discharge criteria (refer to Section 9.4.1). Note these criteria differ to those adopted in the PSI (Douglas, 2025b), the objective of which was to assess potential risk from contamination to on- and off-site receptors from long term exposure via the natural groundwater flow path.

Groundwater quality results are summarised as follows:

- pH values ranged from 4.33 to 5.26, indicating slightly acidic conditions and were below the recommended discharge criteria of between 6 to 8.5;
- Electrical conductivity (EC) values ranged from 291.6 to 795 $\mu\text{S}/\text{cm}$, indicating freshwater conditions and were within the recommended discharge criteria of between 125 to 2200 $\mu\text{S}/\text{cm}$;
- No non-aqueous phase liquids or oily sheens were recorded;
- The concentrations of ammonia as N, Nitrate as N, and Nitrite as N were below the adopted criteria, as applicable;

- Total suspended solids were detected at 290 mg/L in BH01 and at 880 mg/L in BH03 which above the recommended discharge criteria and indicates that the detected metal concentrations could be associated with the solids content in the groundwater;
- The concentrations of total coliforms in both samples were less than PQL;
- The results of potential contaminants were below the adopted discharge criteria, with the exception of:
 - Total Chromium at 4 µg/L in BH01 and at 14 µg/L in BH03 which exceeded the adopted discharge criteria based on ANZG (2018) freshwater guideline (FWG) for the protection of slightly to moderately disturbed freshwater aquatic ecosystems of 1 µg/L. It is noted that the dissolved concentration of Total Chromium in this sample was within the adopted discharge criteria;
 - Total copper at 160 µg/L in BH01 and at 54 µg/L in BH03 exceeded the adopted discharge criteria of 1.4 mg/kg. It is noted that the dissolved concentration of copper in both samples also exceeded the criteria;
 - Total lead at 16 µg/L in BH03 exceeded the site-specific hardness adjusted discharge criteria of 7.2 µg/L. It is noted that the dissolved concentration of lead in this sample was within the criteria;
 - Total nickel at 20 µg/L in BH01 and 26 µg/L in BH03 exceeded the site-specific hardness adjusted discharge criteria of 18.1 µg/L. It is noted that the dissolved concentrations of nickel in both samples were within the criteria;
 - Total zinc at 170 µg/L in BH01 and at 180 µg/L in BH03 which exceeded the site-specific hardness adjusted discharge criteria of 13.2 µg/L. It is noted that the dissolved concentration of zinc in both samples also exceeded the criteria.

The analytical results suggest that groundwater beneath the site has not been significantly impacted by organic contaminants TRH, OCP, OPP, PCB, phenol or VOC. Where exceedances of guideline values were identified, appropriate treatment and disposal controls will be implemented (refer to Section 9.4).

Summary tables of analytical results and laboratory reports are provided in Appendix F and Appendix G, respectively.

6. Conceptual hydrogeological model

The site is predominantly underlain by Ashfield Shale, Mittagong Formation Laminite and Hawkesbury Sandstone. The topography of the area generally grades down toward the southwest into a gully feature that extends into Berrys Creek. The groundwater levels recorded within the monitoring wells indicate that the groundwater flow is typically toward the southwest.

Groundwater levels were variable across the site and ranged between RL 81.9mAHD (BH01) and RL 72.7mAHD (BH03). Impacts from rainfall on the groundwater levels were negligible based on the monitoring. Groundwater was observed to be wholly within the bedrock profile.

The aquifer has been identified as unconfined where groundwater sources flowing into the subject site are considered to originate from rain and surface water infiltration. Over time, these water sources permeate to the natural groundwater that has been observed to be within the bedrock profile.

It should be noted that groundwater levels are transient and fluctuate with climatic variations and other factors (e.g. adjacent excavations, pumping). Therefore, the water levels will temporarily rise during periods of heavy or prolonged rainfall and fall during dry periods. Groundwater levels in the vicinity of the site can also be affected by nearby dewatering activities and existing drained basements.

7. Groundwater inflow assessment

7.1 Numerical modelling methodology

A 2-dimensional (2D) numerical model was developed for the proposed excavation using SEEP/W, a component of GeoStudio 2023.1.2 R2 (version 23.1.2.11) developed by GEOSLOPE International Ltd. Transient and steady state analysis were undertaken to assess the potential dewatering rates and volumes during excavations works and for a long-term drained basement, respectively.

Douglas selected a single vertical cross-section (Section A) as shown in Figure 2 below, in a roughly northeast to southwest direction, intercepting the basement footprint through the centre of the proposed excavation.

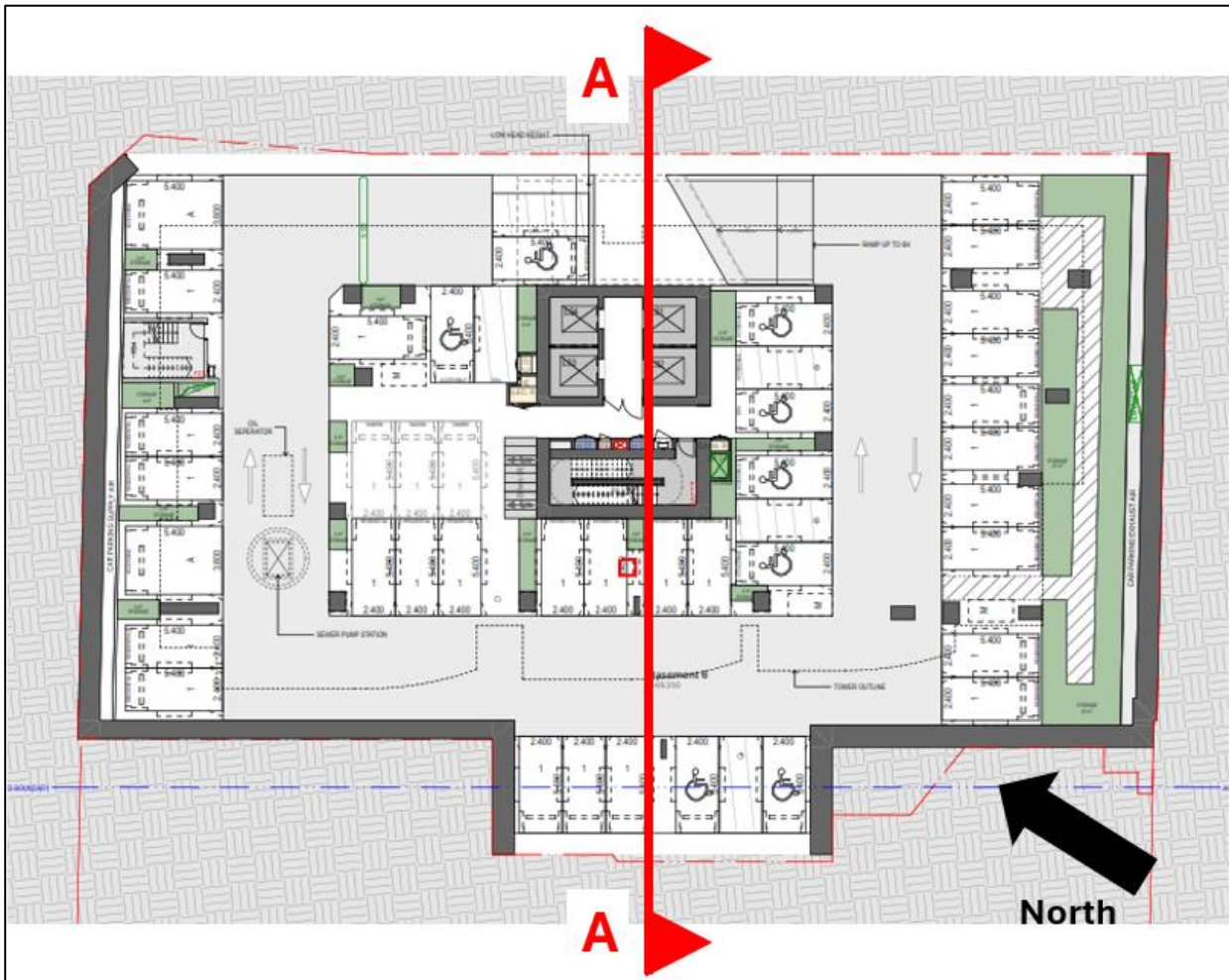


Figure 2: Cross section A, excerpt from architectural drawings (reference GBPH, Sheet No. 20B5) prepared by fjstudio

Bulk excavation level (BEL) for the proposed development was modelled at RL 69 mAHD which is 0.2 m below the lowest basement FFL.

7.1.1 Model layers

The hydrogeological units were simulated as a single layer to simulate the bedrock profile. Surficial soils were excluded from the model and considered negligible for the purpose of this assessment as groundwater was measured within the rock profile.

Adopted hydraulic properties are presented in Table 6. Parameters were selected based on the Geometric Mean result of the hydraulic conductivity testing (Section 5.2.2), ranges of values documented in the available literature for similar lithologies (e.g. Hoek & Bray 1981 and more recently Pells 2019) and previous experience with similar materials.

Table 6: Summary of material parameters for groundwater inflow analysis

Geological Unit	Saturated Kh (m/s)	Anisotropy Ratio (Kv/Kh)	Saturated Volumetric Water Content (%)	Residual Water Content (%)	Material Model Adopted
Bedrock	5.9×10^{-8}	0.5	20	7	Unsaturated / saturated

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

7.2 Model calibration

Initial groundwater levels were established in the model by setting constant head conditions at the lateral extents. The boundary conditions to the northeast and southwest of the model were modelled around 30 m and 160 m from the site, respectively, to simulate constant head conditions heavily influenced by the groundwater drawdown caused by the nearby drained Crows Nest Station Box.

Noting that recorded groundwater in BH01 is considered to be perched, the model adopted the highest recorded groundwater levels from BH02 and BH03 of around RL75.9 and RL74.7 m AHD.

A surface flux was also applied along the ground surface to simulate rainfall. The model was calibrated to roughly match the hydraulic gradient (effective total head) observed within the groundwater monitoring. The initial groundwater head levels prior to dewatering of the subject site are presented in Figure 3 below.

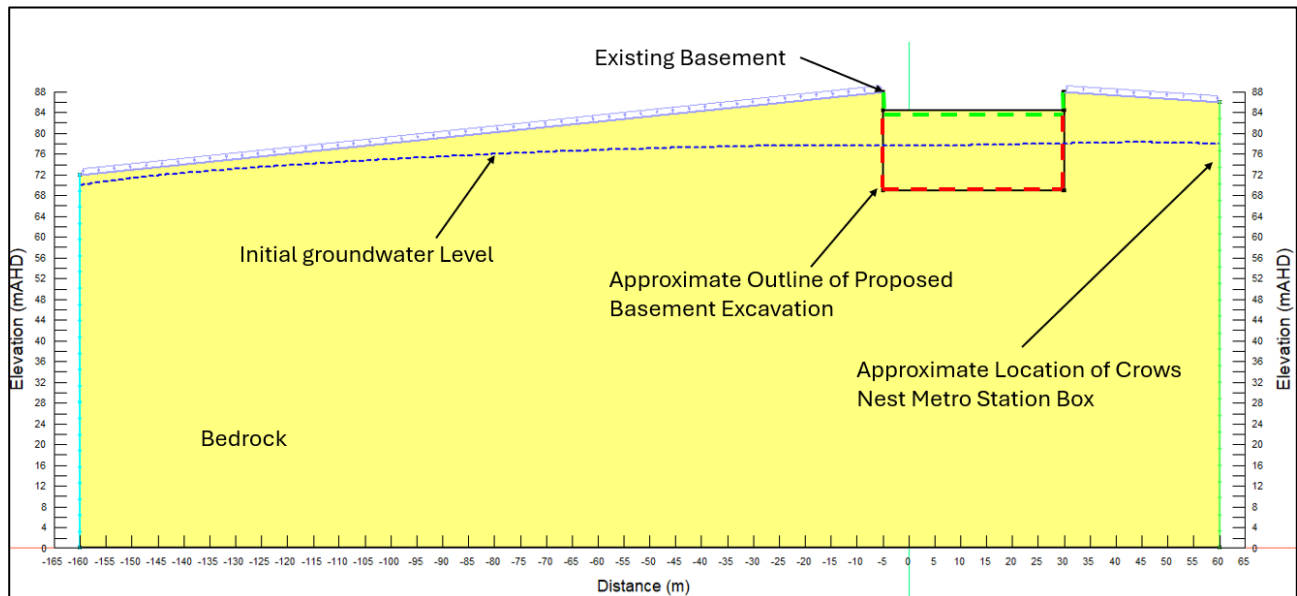


Figure 3: Simulation of initial groundwater levels prior to dewatering

An infiltration flux rate of $1.52 \times 10^{-9} \text{ m}^3/\text{s}/\text{m}^2$, which is equivalent to 4% of an average annual rainfall of 1.2 m in Sydney, was adopted to simulate infiltration and seepage from rainfall to the model surface.

A 'free flow' boundary or 'drained' boundary condition were applied to the base and the sides of the basement excavation to model a 'dry' excavation which will be required during construction.

7.3 Sensitivity scenarios

Two sensitivity scenarios were modelled as follows:

- Sensitivity Case 1 - Adopting a higher groundwater level (approximately 2 m) above recorded BH02 and BH03 levels.
- Sensitivity Case 2 – Adopting a higher (5 times higher) horizontal (Kh) hydraulic conductivity of $2.9 \times 10^{-7} \text{ m/s}$ to assess groundwater inflows under higher hydraulic conductivity conditions.

7.4 Groundwater modelling results

Groundwater inflow into the excavation was assessed adopting a transient and steady state analysis to simulate dewatering during construction and for long term dewatering and assumes the excavation and dewatering to the 'target' depth (RL69 m AHD) is instantaneous.

The inflow rates represent the estimated total rate of groundwater flowing into the excavation and the volume (per unit time) requiring extraction via the dewatering system to dewater the excavation during construction.

The SEEP/W results are based on a two-dimensional model, which assumes the excavation is much longer than its width. The methods proposed by Kavvas et al (1992), shown in Equation 1, were used to adjust the 2D results to allow for the actual length to width ratio of the proposed basement. For the assessment, a width of 35 m and length of 60 m was adopted.

Equation 1

$$\frac{q_o}{q} = 0.7 + 0.3 \left(1 - \frac{B}{L} \right)$$

where: q_o is the predicted 'realistic' inflow rate

q is the inflow rate from 2D modelling

B is the width of the excavation

L is the length of the excavation

7.4.1 Predicted groundwater inflow

The model assumes excavation and dewatering to the target depth of RL 69 mAHD is instantaneous, resulting in substantial predicted inflows during the first day of construction. In reality, dewatering will in parallel with excavation staging to gradually lower the water table to the desired level.

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

Elapsed Time (days)	Dewatering Inflow Rate	
	Inflow rate (L / min)	Cumulative Inflow (ML)
10	3.7	1.5
23	3.5	
39	3.3	
59	3.2	
85	3.1	
118	3.0	
160	2.9	
213	2.8	
280	2.7	
365	2.6	
Post-construction	2.3	1.2*

Notes * in megalitres per year

Table 8: Sensitivity case 1 (high GWL) - Simulated groundwater inflow

Elapsed Time (days)	Dewatering Inflow Rate	
	Inflow rate (L / min)	Cumulative Inflow (ML)
10	4.6	1.9
23	4.3	
39	4.1	
59	4.0	
85	3.8	
118	3.7	
160	3.6	
213	3.5	

Elapsed Time (days)	Dewatering Inflow Rate	
	Inflow rate (L / min)	Cumulative Inflow (ML)
280	3.4	1.5*
365	3.3	
Post-construction	2.9	

Note: GWL: groundwater level
 * in megalitres per year

Table 9: Sensitivity case 2 (high K) - Simulated groundwater inflow

Elapsed Time (days)	Dewatering Inflow Rate	
	Inflow rate (L / min)	Cumulative Inflow (ML)
10	16.5	6.7
23	15.1	
39	14.2	
59	13.6	
85	13.1	
118	12.7	
160	12.3	
213	12.0	
280	11.8	
365	11.6	
Post-construction	11.2	5.9*

Note: K: hydraulic conductivity
 * in megalitres per year

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

Also, simulated dewatering rates and drawdown are dependent on the dewatering scheme adopted for the site, and construction design (e.g., shoring walls), as included in the numerical models. If the depth of basement level and dewatering systems were to change then the currently predicted dewatering rates may change, in which case further modelling would be required.

7.4.2 Predicted groundwater drawdown and settlement

Groundwater levels immediately outside the basement excavation are expected to be drawn down to BEL as shown in Figure 4 below, with the drawdown curve rising away from the basement. As the basement is drained, there will be no mounding occurring. There are negligible impacts expected to surrounding properties and infrastructure from drawdown as the groundwater is contained within and flowing through the bedrock profile with high deformation moduli.

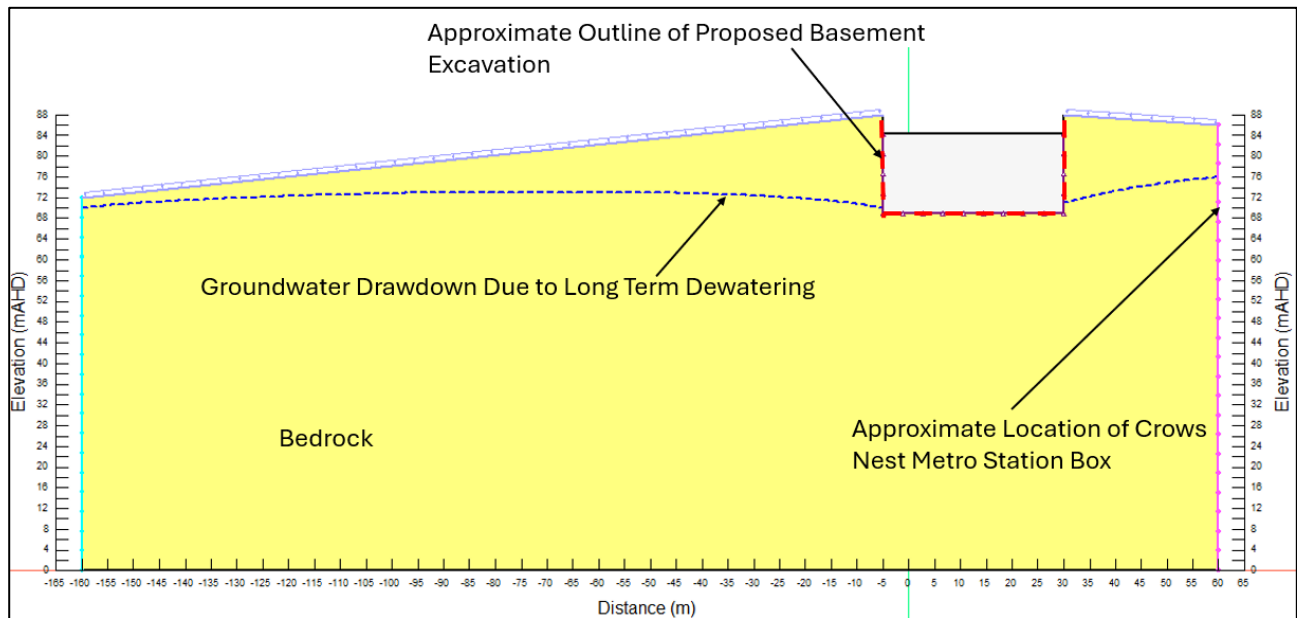


Figure 4: Simulation of excavation with drawdown

8. Impact assessment

8.1 Aquifer Interference Policy consideration

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

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

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

8.2 Environmental risk assessment

An assessment of the potential effects of dewatering on neighbouring properties and groundwater receptors has been summarised in Table 10.

Table 10: Assessment of Potential Effects of Dewatering

Item	Comment
Impacts on potential GDEs	There are no GDEs within 500 m of the site (Section 4.6).
Water supply losses by neighbouring groundwater users	No water bores were located within 500 m of the site (Section 4.5).
Potential subsidence of neighbouring structures	Groundwater drawdown is predicted to occur within the bedrock profile with high deformation moduli. Therefore, risk of subsidence due to lowering of the water table is expected to be negligible.
Mounding of water upgradient of structure	As the basement is proposed to be drained, mounding of groundwater is not expected upgradient of the site.
Contamination and Water quality	A review of contamination risk and baseline water quality data (Section 5.2.3) has been undertaken. Based on this review and the project details it is considered that: • The available data indicates that dewatering may extract groundwater with contaminants or other parameters which exceed the discharge criteria (refer to Section 5.2.3).

Item	Comment
	- The available data does not indicate a potential for the dewatering to mobilise an off-site contamination plume. - The available data has not identified the potential for works to change the suitability of groundwater beyond 40 m from the site for identified beneficial re-uses. Controls to mitigate potential contamination impacts from discharge of the extracted groundwater are provided in Section 9.4 and include treatment and monitoring of the extracted water prior to discharge.
ASS	<u>On-site</u> Acid Sulphate Soils (ASS) are not considered to be present on the site. As such no further on-site assessment or management is considered warranted. <u>Off-site</u> For Class 5 land, development consent is required for works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land. The predicted groundwater drawdown (Section 7.4.2) indicates that the drawdown will be in bedrock and that the drawdown level will not extend to lands below 5 m AHD. As such, no management is considered warranted for off-site ASS.
Salinity	Salinity is not a concern and thus further assessment, or management is not required.

9. Recommended management strategy

9.1 General

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

The proposed dewatering and discharge approach is outlined in Section 2.2 and forms the basis of the groundwater inflow assessment and impact assessment given in Section 7 and 8, respectively.

Appropriate management strategies will be required during construction and operation, to ensure that the impact and inflows arising from dewatering remain within the expected values.

9.2 Groundwater inflow control

9.2.1 Control measures and monitoring

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

Groundwater inflow control measures may include:

- Perimeter drainage to capture and divert groundwater;
- Inflow reduction measures. Such as grouting or ground improvement.

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

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

More information on recommended monitoring is provided in Section 9.5.

9.2.2 Trigger levels

Control measures will be monitored against inflow volumes, with an initial trigger level established at 80% of the maximum predicted inflows outlined in Section 7.4.1. Reaching this level will initiate increased monitoring and review of excavation and dewatering conditions, with consideration given to the implementation of mitigation measures (e.g. localised grouting or sealing works) to minimise the risk of further inflow increases. If inflows exceed the maximum predicted inflows outlined in Section 7.4.1, dewatering and excavation works must be halted and additional mitigation measures implemented prior to works recommencing.

9.3 Discharge options and contingency measures

Management options for groundwater disposal are presented in Table 11.

Based on groundwater quality testing and predicted dewatering rates, Option 1 (disposal to stormwater) is considered feasible. The other two options listed in Table 11 are provided as contingency plans.

Table 11: Summary of possible management options

Management Option	Comments
<u>Option 1:</u> On-site treatment (if required) and disposal to stormwater.	Generally applicable where the treatment required is routine, e.g., solids removal, alum dosing and pH adjustment. Treatment of specific contaminants may require more physical space and result in higher treatment costs. Water disposed to stormwater is typically required to meet general NSW DPE requirements (NSW DPE 2021 & 2022), ANZG (2018) water quality standards for the relevant receiving water body and any associated uses (Section 9.4.3). Further requirements may be enforced depending on the specific approval documentation.
<u>Option 2:</u> * Disposal to the sewer under a Trade Waste Agreement with Sydney Water.	Generally, will require further negotiation and establishment of water quality criteria prior to disposal. Water quality screening levels will depend on the specific trade waste agreement with Sydney Water.
<u>Option 3:</u> ** Tanker off-site for disposal at a licensed liquid waste treatment facility.	May be suitable for more heavily contaminated liquids where on-site treatment is not practicable. Appropriate as a contingency strategy. Can be limited in applicability for larger volumes of water. Water quality screening levels will depend on specific requirements of the waste facility (including their Environmental Protection Licence conditions)

Notes:

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

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

9.4 Water quality control

As outlined in Section 2.2, the preferred disposal option is on-site treatment (if required) and disposal to stormwater, subject to approval from relevant authorities, and appropriate testing and treatment as described in subsequent sections.

Based on the water testing discussed in Section 5.2.3 and the environmental risk assessment conducted in Section 8.2, it is likely that some form of treatment of groundwater will be required prior to discharge.

9.4.1 Discharge criteria

The discharge criteria, and rationale for the criteria are provided in Appendix F. The adopted discharge criteria are based on the stormwater system discharging to Parramatta River, a freshwater body. The discharge criteria include levels adopted from:

- ANZG, 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018' (ANZG, 2018), with a 95% level of protection (LOP) for freshwater ecosystems;
- HEPA PFAS National Environmental Management Plan (NEMP) Version 3.0 (HEPA 2025), with a 95% level of protection (LOP) for freshwater ecosystems;
- NHMRC Guidelines for Managing Risks In Recreational Water (NHMRC, 2008); and
- ANZECC, Australian Water Quality Guidelines 2000, Tables 3.3.2 to 3.3.3 Default trigger values for physical and chemical stressors in south-east Australia for slightly disturbed ecosystems (i.e., marine waters) (ANZECC, 2000). Physiochemical parameters are considered indicative only, and should not necessitate treatment without further review, e.g., pH 7 (neutral) water would be practicable to discharge to a marine (pH ~8-8.5) environment.

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

The discharge criteria are summarised in below Table 12.

Table 12: Summary of screening criteria (units given in µg/L unless otherwise stated)

Analyte		Fresh water (95% LOP)	Recreational water guideline values	Physical Parameters
Metals	Arsenic (III / V)	24/13	100	-
	Cadmium	0.3*	20	-
	Chromium (III / VI)	1	500	-
	Copper	1.4	20000	-
	Mercury (inorganic)	0.6	10	-
	Lead	7.2*	100	-
	Nickel	18.1*	200	-
	Zinc	13.2*	30000 (aesthetic only)	-
	Manganese	-	5000	-
	Iron	280	-	-
BTEX	Benzene	950	10	-
	Ethylbenzene	80	3000	-

Analyte		Fresh water (95% LOP)	Recreational water guideline values	Physical Parameters
	m-Xylene	75	6000 (total xylene)	-
	o-xylene	350	6000 (total xylene)	-
	p-Xylene	200	6000 (total xylene)	-
	Toluene	180	8000	-
PAH	Anthracene	0.4	-	-
	Benzo(a)pyrene	0.2	0.1	-
	Fluoranthene	1.4	-	-
	Naphthalene	16	-	-
	Phenanthrene	2	-	-
TRH	C ₆ -C ₁₀	10 (< PQL) ^a	-	-
	C ₁₀ -C ₁₆	50 (< PQL) ^a	-	-
	C ₁₆ -C ₃₄	100 (< PQL) ^a	-	-
	C ₃₄ -C ₄₀	100 (< PQL) ^a	-	-
Phenols	Phenol	320	-	-
	Pentachlorophenol	3.6	100	-
	2,4,6-Trichlorophenol	3	200	-
PCB	Aroclor 1242	0.6	-	-
	Aroclor 1254	0.03	-	-
OCP	Aldrin	0.001	3 (Aldrin + Dieldrin)	-
	Chlordane	0.08	20	-
	DDT	0.01	90	-
	Dieldrin	0.01	3 (Aldrin + Dieldrin)	-
	Endosulfan	0.2	200	-
	Endrin	0.02	-	-
	Heptachlor	0.09	3	-
	Lindane	0.2	-	-
	Methoxychlor	0.005	3000	-

Analyte		Fresh water (95% LOP)	Recreational water guideline values	Physical Parameters
OPP	Chlorpyrifos	0.01	100	-
	Diazinon	0.01	40	-
	Dimethoate	0.15	70	-
	Fenitrothion	0.2	70	-
	Malathion	0.05	700	-
	Parathion	0.004	200	-
VOC	Tetrachloroethene (PCE)	70	500	-
	Trichloroethene (TCE)	330	-	-
	cis-1,2-dichloroethene (DCE)	700	300	-
	Chloroethene (vinyl chloride / VC)	100	3	-
	Tetrachloromethane (carbon tetrachloride / CT)	240	30	-
	Trichloromethane (chloroform / TCM)	770	2500	-
Nutrients - Dissolved	Ammonia as N	900	-	-
Oil and Grease		5000 (< PQL) ^a	5000 (< PQL) ^a	Nonvisible
Faecal Coliforms		100 (<PQL) ^a	100 (<PQL) ^a	-
Physical Parameters	Conductivity	-	-	125 - 2200 μ s/cm ^b
	pH	-	6.5-8.5 aesthetic only)	6-8 ^b (6.5-8.5) ^c
	Dissolved Oxygen	-	>80% saturation (aesthetic only)	85-120 % saturation ^b
	Turbidity	-	-	6-50 NTU ^b
	Total Suspended Solids	-	-	< 50 mg/L ^d

Notes: * Site specific hardness adjusted criteria
 PQL – laboratory practical quantification limit
 a – set at the laboratory PQL, example limits given

b – given as comparative levels for lowland rivers. Typical conductivity values for coastal rivers in NSW are cited as 200-300 $\mu\text{S}/\text{cm}$

c – range of typical neutral pH conditions.

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

9.4.2 Treatment options

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

- Sediment control: Settling tanks or flocculation to reduce turbidity and suspended solids;
- pH adjustment: Dosing with lime or acid to achieve acceptable discharge pH;
- Metals removal: Filtration or chemical precipitation, if metal concentrations exceed guidelines following flocculation; and
- Hydrocarbon removal: Use of oil-water separators and / or activated carbon filters (unlikely to be required based on current results, but potentially required during construction stage).

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

9.4.3 Proposed water quality monitoring

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

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

The requirements for each phase are provided below.

9.4.3.1 Baseline monitoring

The purpose of the baseline monitoring is to assess the quality of the untreated groundwater to inform the required treatment prior to discharge to prevent environmental harm of the receiving water body. It is considered that the following additional baseline water quality testing is required to supplement the previous testing and to inform treatment / management requirements and disposal options:

- Collection of a sample from the receiving surface water body and analysis for:
 - o Hardness, pH, metals and nutrients.
- Collection of untreated water samples and quality control samples [from the sumps/dewatering wells] testing for:
 - o pH, metals, VOCs and nutrients.
- Measurement of general groundwater physical parameters given in Section 9.4.3.4 using a calibrated water quality meter; and

- Analysis of the samples by a NATA accredited laboratory for the analytes as indicated Section 9.4.3.4.

Previous testing of other potential contaminants of concern is considered sufficient to fulfill the requirements of baseline testing.

Sampling is to be conducted by a suitably qualified environmental consultant. Water quality sampling from groundwater wells should be conducted in accordance with Geoscience Australia's Groundwater Sampling and Analysis – A Field Guide (Geoscience Australia 2009).

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

9.4.3.2 **Treatment trial monitoring**

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

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

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

The treatment trial monitoring is to include testing for the analytes listed in Section 9.4.3.4.

The treatment trial is to continue until three sequential samples of treated water meet the discharge criteria.

Sampling and analysis of three samples of untreated water (over three sampling events) for all analytes in Section 9.4.3.4. is also to be conducted, either as part of the treatment trial (if suitable water available for sampling), or otherwise in the initial stage of the routine testing.

9.4.3.3 **Routine monitoring**

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

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

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

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

9.4.3.4 Analytes

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

- The requirements of DPE (2022);
- The contaminants of potential concern identified in the previous investigations (refer to Section 4.9.2);
- The baseline water quality data (refer to Section 5.2.3);
- The potential for spills / leaks during excavation works;
- General parameters to inform suitability of the water for discharge and changes in groundwater source.

Table 13 Proposed suite of analytes for water quality monitoring

Category	Analytes	Minimum frequency
Field parameters	Temperature, EC, pH, turbidity, oil and grease (visual)	Baseline ¹ Treatment trial ¹ Daily
Physical parameters	TDS, TSS	Baseline ¹ Treatment trial ¹ Monthly ¹
Major ions	Calcium, magnesium, sodium, potassium, chloride, sulphate and alkalinity (total, carbonate and bicarbonate)	Baseline ¹ Treatment trial ¹ Monthly ¹
Metals (total and dissolved)	Arsenic, cadmium, chromium, copper, iron, mercury, nickel, lead and zinc	Baseline ¹ Treatment trial ² Every routine sampling event ²
Potential contaminants	TRH (or TPH), BTEX	Baseline ¹ Treatment trial ²

Category	Analytes	Minimum frequency
		Every routine sampling event ²
	PAH, VOC	Baseline ¹

Notes:

1. Based on requirements of DPE (2022)
2. Based on available data. Sampling requirements and frequencies may be reviewed as discussed in Section 9.4.3.3

Acronyms: EC: electrical conductivity | TDS: total dissolved solids | TSS: total suspended solids

TRH: total recoverable hydrocarbons | TPH: total petroleum hydrocarbons

BTEX: benzene, toluene, ethylbenzene and xylenes

PAH: polycyclic aromatic hydrocarbons

VOC: volatile organic compounds

9.5 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.

The NSW Department of Planning and Environment (DPE) minimum requirements for building site groundwater investigations and reporting (DPE, 2022) recommend that three monitoring wells should be installed outside of the excavation and positioned to triangulate hydraulic gradients and groundwater flow directions from water level measurements. However, as discussed in Section 8, impacts from drawdown are considered to be minor and, subject to approval by DCCEEW, no groundwater level monitoring wells have been nominated.

Table 14: Monitoring and reporting requirements

Item	Monitoring requirements	Methodology
Visual inspection	No visible oil and grease, sheen, significant discolouration or odours.	Daily inspections (by contractor). HOLD POINT - If indicators are observed, discharge must be suspended pending analytical confirmation.
Field parameter assessment	pH, daily, preferably continuously	• Prior to discharge/ daily during discharge (by contractor).
Water quality sampling and testing	Samples from treated water to assess compliance with discharge criteria (Section 9.4.1).	All monitoring: • Sampling by suitably experienced environmental engineer / scientist. • Field parameters (pH, EC, turbidity) using field probes.

Item	Monitoring requirements	Methodology
	As per analytical requirements in Section 9.4.3.4. Samples from untreated water as required to inform treatment requirements	- Chain of Custody (COC) documentation to accompany all samples. - Analysis by a NATA-accredited laboratory. Baseline and treatment trial - As per Section 9.4.3. Routine - Sampling pre-discharge (batch discharge). - Sampling twice weekly (continuous discharge). - Review and update frequency in accordance with Section 9.4.3.4. HOLD POINT - If water exceeds assessment criteria (SAC), manage as per contingency strategy (Section 9.7). HOLD POINT - If water exceeds assessment criteria (SAC), manage as per contingency strategy (Section 9.7).
Quality control sampling	Replicate sampling to verify lab result accuracy.	- Conducted during above sampling events. - Analyse at a rate of 10% of samples. - Testing suite: Metals, TRH, BTEX. - Results to be included in final dewatering completion report.
Quantity of groundwater inflows	Measurements of groundwater volumes (as per Section 9.2).	- Weekly monitoring and reporting of groundwater abstraction volumes. - Weekly reporting of volumes to the Environmental Consultant. - Results to be included in final dewatering completion report. HOLD POINT - If volumes exceed trigger levels or Council discharge allowance, works must be halted to minimise inflow (e.g., via grouting).
Dewatering completion report	Final documentation of the dewatering program.	Prepared by a suitably qualified consultant and to include: - Summary of contractor records (e.g. visual inspections, unexpected finds) - Full analytical and quality control results. - Records of dewatering volumes. Commentary on compliance and any non-conformances with the GIA.

9.6 Personnel and responsibilities

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

Table 15: Personnel and Responsibilities

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

9.7 Contingency plan

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

- Entity recording the non-conformance to notify the Site Manager / Contractor and other relevant parties (e.g. geotechnical or Environmental Consultant);
- Dewatering volumes:
 - o Suspend discharge;
 - o Should dewatering volumes be higher than predicted or higher than discharge limits provided by relevant authorities, suspend construction and reduce pumping rates. Options could include grouting to reduce groundwater inflows;
- Water quality discharge criteria non-conformance:
 - o Review of results by Environmental Consultant to assess potential risk to environment;
 - o Should water quality be deemed unsuitable for disposal, suspend dewatering and (further) treat water prior to discharge;
 - o If relevant, Environmental Consultant to inspect the site / unexpected finds and collect additional water quality samples to assess issue of concern;
 - o Review treatment procedures and update methodology as required to improve treatment outcomes;
 - o Written advice by the Environmental Consultant that additional laboratory analytical results meet the discharge criteria and / or that recommending that continued

discharge is not considered to pose an unacceptable environmental risk and / or recommending additional work (as applicable);

- Off-site tankering may be adopted to meet disposal requirements; and
- Notification to relevant regulatory authorities, as required under approvals.

10. Approvals and licensing

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

10.1 Water Access Licence (WAL) and entitlements

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

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

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

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

10.2 Water Supply Works Approval (WSWA)

As the project is an SSD, a separate water supply works approval for construction dewatering is not required.

10.3 Council and EPA approvals

Depending on the proposed discharge route and water quality:

- Discharge to stormwater: Council approval may be required. Acceptance criteria typically align with ANZG guidelines and site-specific conditions – refer to Section 9.3;
- Discharge off-site: A licensed contractor must be engaged, and records of transport and disposal must be maintained – refer to Section 9.3.

11. Conclusion

The proposed development is expected to have a basement BEL of RL 69 mAHD which will require excavations of up to approximately 18 m below existing surface levels with deeper localised excavations for the lift pit. The proposed basement is expected to be designed as drained with groundwater discharging into the council stormwater.

The 2D seepage analysis for the proposed development model was based on the highest groundwater levels recorded within BH02 and BH03 along with the geometric mean horizontal permeability value from the field testing. The results of the analysis indicate that the predicted annual inflows for long-term dewatering into the drained basement is 1.2 ML. As the predicted inflow rate is less than 3 ML per year, a WAL will not be required. Records of actual inflow volumes during construction should be maintained and reported to DCCEEW.

Two sensitivity cases were modelled adopting conservative conditions to assess inflows rates under adverse conditions such as higher groundwater (Case 1) and horizontal hydraulic conductivity rates (Case 2). The results of sensitivity Case 1 indicate that inflows into the basement for continuous long-term dewatering is also less than 3 ML per annum under higher (2 m) groundwater level conditions. The results of sensitivity Case 2 indicate that annual inflows into the basement could be greater than 3 ML under higher (5 x) hydraulic conductivity conditions.

Disposal of the groundwater seepage should be managed appropriately with the relevant authorities, and will require treatment of the groundwater prior to disposal, which is typical. Ongoing monitoring of groundwater quality will be required during discharge periods to confirm compliance with the water quality acceptance criteria.

As any drawdown is predicted to be within the rock profile, the risk of subsidence in neighbouring structures due to dewatering is expected to be negligible.

From a hydrogeological viewpoint, it is considered that a drained basement is feasible without significant impacts on surrounding groundwater systems or property, subject to review and approval from DCCEEW and other relevant authorities.

It should be noted that if there are changes to surrounding basements or water levels are found to be higher than assumed, there may be an increase in groundwater inflows which should be considered for basement design.

12. References

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Douglas2026, Groundwater monitoring report by Douglas (Reference 236315.00.R.004.Rev0, dated 8 January 2026)

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

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

13. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 402-420 Pacific Hwy, Crows Nest NSW in accordance with Douglas' proposal (236315.00.P.001.Rev0, dated 11 June 2025) and email acceptance received from Natalie Bocock of Prosper Atrium Pty Ltd dated 27 July 2025 instructing to proceed. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Prosper Atrium Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

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

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

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

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

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

Appendix A

About This Report

Introduction

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

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

Copyright

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

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

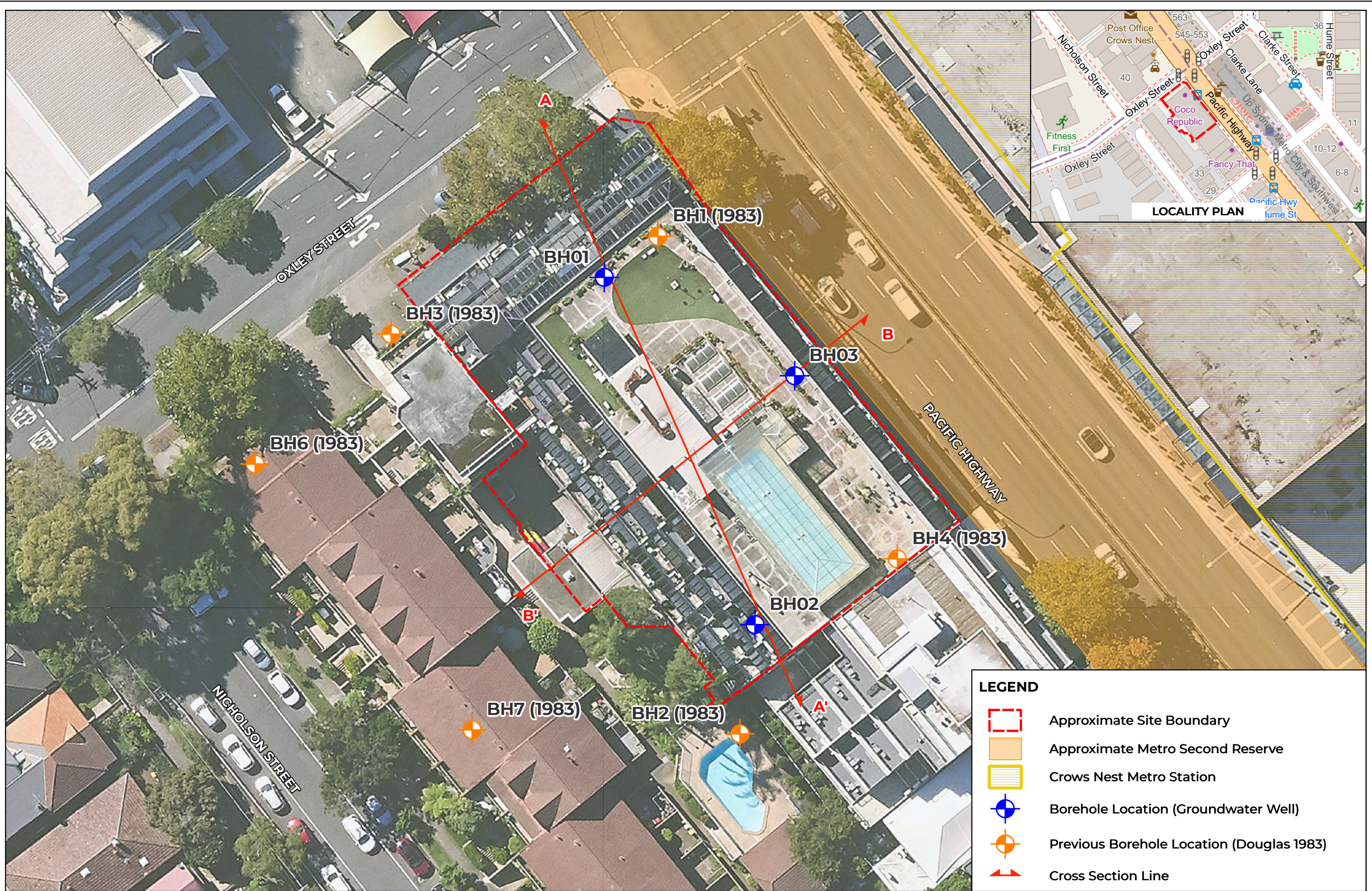
Site Inspection

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

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Appendix B

Drawings



LEGEND

Approximate Site Boundary

Approximate Metro Second Reserve

REV		DESCRIPTION/COMMENT	DATE	DRAWN BY	 PARTNERS OFFICE: SYDNEY 96-98 Hermitage Rd, West Ryde NSW 2114 (02)9809 0666	CLIENT:	NOTE:	PROJECT NAME:	DRAWING TITLE:	PROJECT NO:					
O		INITIAL	20.10.2025	YG						236315.00					
SCALE:						Prosper Atrium Pty Ltd	1: Basemap from Metro Map (Dated 4.09.2025)	PROJECT ADDRESS: 402-420 Pacific Highway, Crows Nest NSW	TEST LOCATION PLAN	DRAWING NO:					
										1					
										REVISION:					
										0					
						COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56									

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

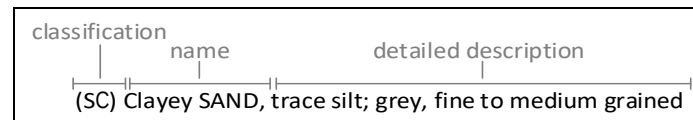
Graphic Symbols

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
	Medium	2.36 - 6.7
	Fine	0.6 - 2.36
Sand	0.21 - 0.6	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

Rock Descriptions

Terminology
Symbols
Abbreviations

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.

intentionally blank



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
Driven Tube sample	DT
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U ¹
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

¹ – numeric suffixes indicate tube diameter/width in mm

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

Field and Laboratory Testing

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

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

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

Field and laboratory testing (continued)

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

Groundwater Observations

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

Drilling or Excavation Methods/Tools

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

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

¹ – numeric suffixes indicate tool diameter/width in mm

BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
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
RL (m)															
	0.12	CONCRETE SLAB.		NA	NA	NA			A/ES		0.12	DCP9/150	5 10 15 R 25/50mm	Concrete	
84	0.25	FILL / SAND trace clay trace gravel: pale brown; fine to medium; fine to coarse, igneous and sandstone gravel.		FILL	MC	M					0.20				
	0.60										0.40				
	0.70										0.50				
	1	Silty CLAY (CI-CH) trace gravel: pale grey mottled red-brown; medium to high plasticity; fine to medium, ironstone gravel.		XWM	H	w<PL			*		0.60				
		SILTSTONE: pale grey; very low strength. Ashfield Shale.				NA	NA		A		0.70				
		Continued as rock log													
	2										1				
	3										2				
	4										3				
	5										4				
	6										5				
	7										6				
	8										7				
	9										8				

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

PLANT: Comacchio Geo 205

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip

METHOD: DT to 0.12m, then AD/T to 0.7m, then HQ3 to 19.5m

CASING: HWT to 0.7m

REMARKS: Replicate Sample *BD20250911 taken from 0.40-0.50m.

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
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

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

PLANT: Comacchio Geo 205

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip

METHOD: DT to 0.12m, then AD/T to 0.7m, then HQ3 to 19.5m

CASING: HWT to 0.7m

REMARKS: Replicate Sample *BD20250911 taken from 0.40-0.50m.

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BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
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)	SOIL STRENGTH (where encountered)			PS	HW															DL	VL
	7.4	[CONT] SANDSTONE: pale grey and grey, fine to coarse grained; with siltstone laminations (<10%) Mittagong Formation.		HW			L				10.27-10.34m: JT x2, 20-40°, PR, CN, VR										
	11			SW				L	M				10.68m: JT, 70°, PR, CN, RF				11	PLT	PL(A)=0.24MPa		
	11.16			SW									11.18m: EW, 0°, 50mm								
	11.33			XW									11.23m: JT, 15°, PR, VNR Clay, SM								
	11.42	INTERBEDDED SILTSTONE (60%) AND INTERLAMINATED SANDSTONE (40%): grey and dark grey, fine to medium grained sandstone. Mittagong Formation.		XW							11.36m: DS, 10°, 70mm										
	12			SW					M				11.50m: JT, 15°, PR, VNR Clay, RF				12	PLT	PL(A)=0.36MPa		
	12.52												11.76-11.82m: SS x3, 10° Clay								
	13			SW					M				12.54m: EW, 0°, 70mm				13	PLT	PL(A)=0.63MPa		
	13.65	SILTSTONE: dark grey, with fine grained sandstone laminations (10%-20%). Mittagong Formation.									13.11m: EW, 0°, 25mm										
	13.75												13.46m: B, 0°, PR, CN, RF								
	14			SW					M				14.09m: B x2, 0°, PR, CN, RF				14				
	15.02								L	M			14.21-14.50m: B x2, 0-10°, PR, INF Clay 5mm, SM					PLT	PL(A)=0.21MPa		
	16	SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.		FR							14.56m: JT, 45°, PR, CN, RF										
	16												14.63m: JT, 15°, IR, VNR Clay, SM				15	PLT	PL(A)=0.35MPa		
	17								M				14.68m: SS, 15-40°, 35mm					PLT	PL(A)=1.3MPa		
	17.86												14.77m: B, 0°, PR, CN 10mm, RF								
	18	SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.		FR							14.88m: JT, 60°, PR, CN, VR										
	18												16.38m: DS, 0°, 50mm				16	PLT	PL(A)=0.63MPa		
	19								M				16.48-16.58m: JT x2, 50-85°, PR, CN, VR, or VNR Clay, SM				17				
	19												16.85-17.32m: JT x3, 45-85°, IR, HE CA, SM					PLT	PL(A)=1.1MPa		
	17.86	SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.		MW			L				17.49m: SS, 20°, 30mm										
	18												17.85m: DS, 0°, 30mm				18	PLT	PL(A)=0.98MPa		
	19												18.66m: JT, 30°, PR, CN, RF								
	19								M				18.80m: SS, 30°, 20mm				19	PLT	PL(A)=0.65MPa		
	19.50	Borehole discontinued at 19.50m depth. Target Depth Reached.																			

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

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

PLANT: Comacchio Geo 205
METHOD: DT to 0.12m, then AD/T to 0.7m, then HQ3 to 19.5m
REMARKS: Replicate Sample *BD20250911 taken from 0.40-0.50m.

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip
CASING: HWT to 0.7m

Refer to explanatory notes for symbol and abbreviation definitions

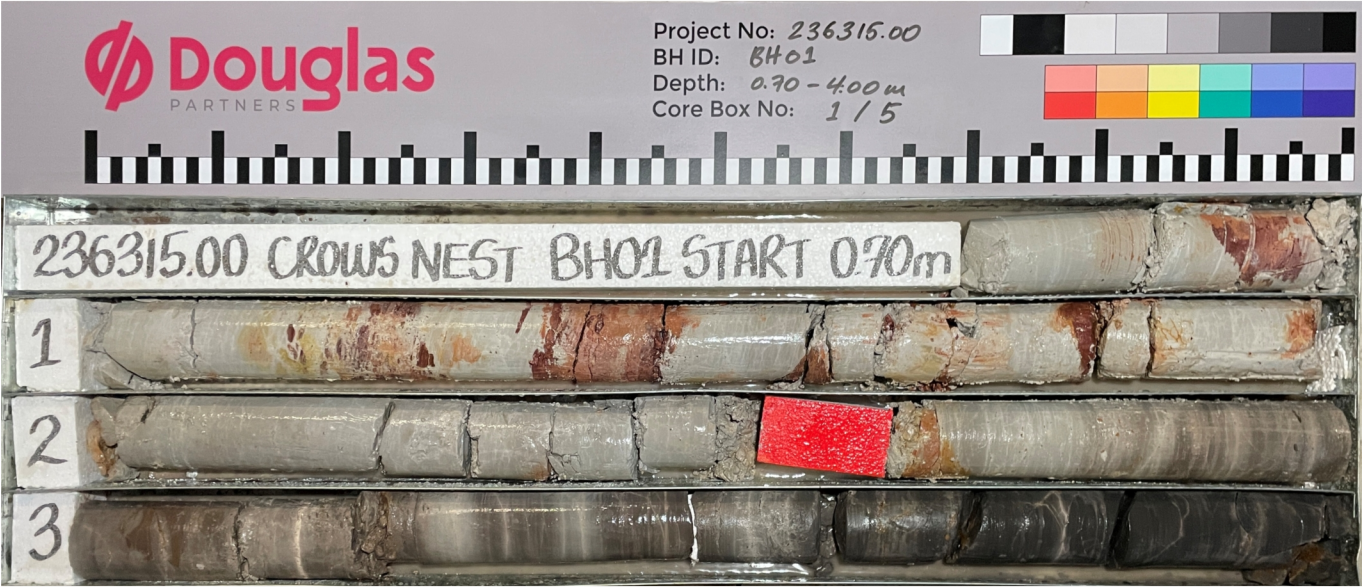


CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
SHEET: 1 of 3



0.70-4.00 m depth



4.00-8.00 m depth

CORE PHOTO LOG

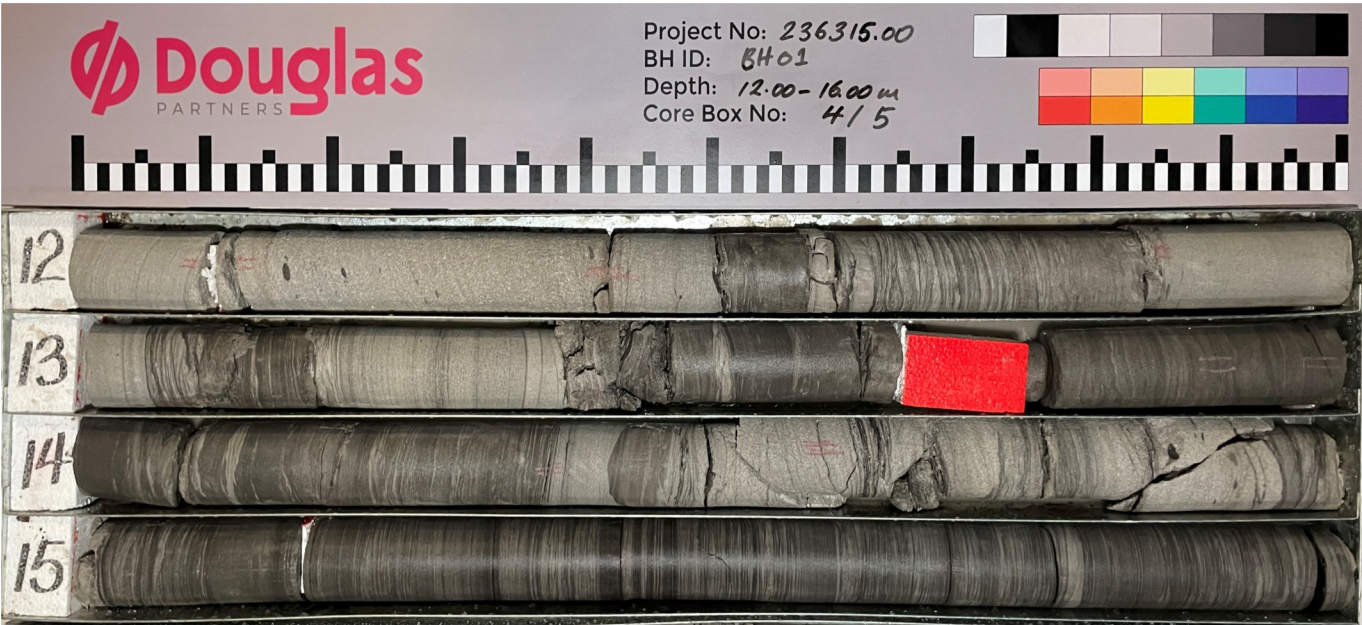
CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
SHEET: 2 of 3



8.00-12.00 m depth



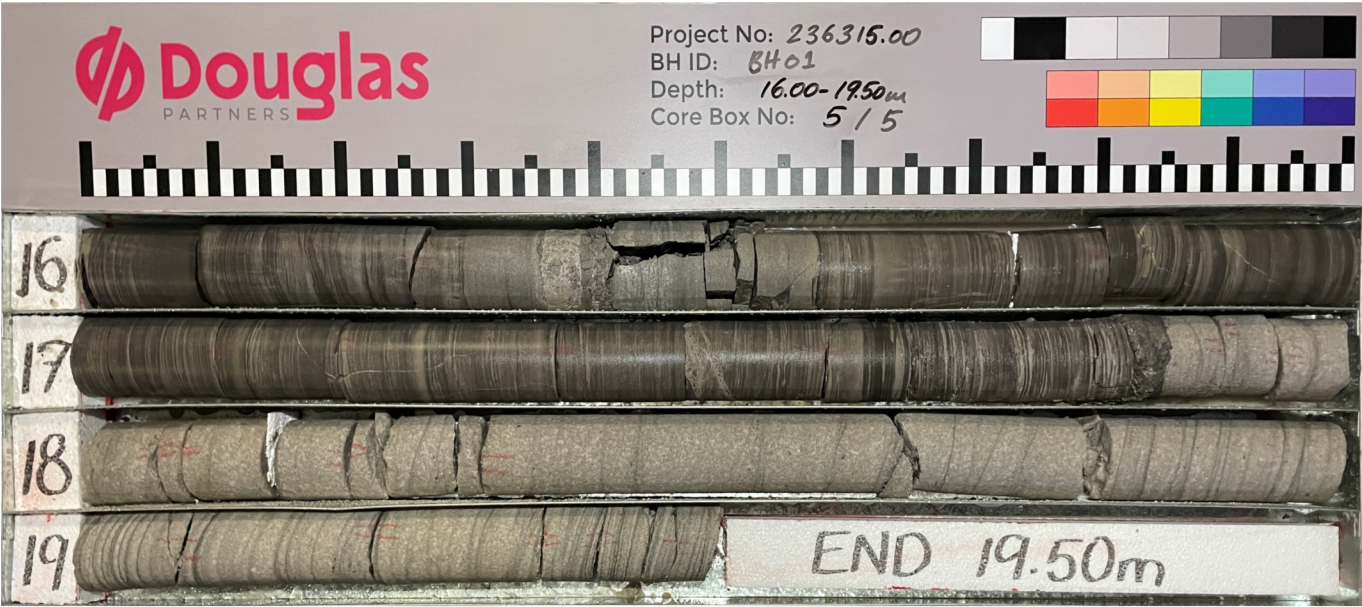
12.00-16.00 m depth

CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333256.6, N:6255744.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH01
PROJECT No: 236315.00
DATE: 11/09/25 - 12/09/25
SHEET: 3 of 3



16.00-19.50 m depth

BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333273.7, N:6255705.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED							SAMPLE			TESTING AND REMARKS																					
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN (#)	CONSIS. ⁽¹⁾	DENSITY. ⁽²⁾	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE															
		0.14	CONCRETE SLAB.		NA	NA	NA			A/ES		0.14	DCP9/150	<table><tr><td>5</td><td>10</td><td>15</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>	5	10	15													Concrete	
5	10	15																													
		0.20	FILL / SAND trace gravel: pale brown; fine to medium; fine to coarse, igneous and sandstone gravel.							A/ES		0.20																			
			Silty CLAY (CI-CH) trace gravel: pale grey mottled red-brown; medium to high plasticity; fine to medium, ironstone gravel.		XWM	H		w<PL		A/ES		0.50																			
		1										0.80																			
		1.50	Continued as rock log							A		1.30																			
		2										1.50																			
		2										2																			
		3										3																			
		4										4																			
		5										5																			
		6										6																			
		7										7																			
		8										8																			
		9										9																			

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

PLANT: Comacchio Geo 205
METHOD: DT to 0.14m, then AD/T to 1.5m, then HQ3 to 19.52m
REMARKS:

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip
CASING: HWT to 1.5m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333273.7, N:6255705.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED											SAMPLE			TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (When not otherwise stated)	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)	TEST TYPE														RESULTS AND REMARKS				
	34																		
	1																		
	33	Continued from soil log																	
	2	Silty CLAY (CH): pale grey; high plasticity; with ironstone bands; Extremely weathered siltstone.			XW	1.50	SOIL	100	0	SOIL									
	2.42																		
	2.45					2.45													
	3				XW		SOIL	99	0	SOIL									
	3.90																		
	3.90	SILTSTONE: pale grey and red-brown. Ashfield Shale.			HW	3.90	VL												
	4.30					4.30													
	4.35	3.90m-4.86m: Highly fractured ironstone band						100	0		4.30-4.35m: EW, 15°, 55mm								
	5	4.86m: grey			HW		VL				3.90-4.86m: Numerous B and JTs, highly fractured ironstone, spaced at 10-20mm.								
	6							100	0		4.90-5.26m: B x4, PR, SN Fe, RF								
	6.06				XW	6.06					5.40-5.77m: B x5, 0-10°, PR, SN Fe, VR								
	6.14				HW	6.14					5.60-5.96m: JT x8, 45-85°, CU, SN Fe, VR, or CN								
	6.28										6.12-6.16m: B x4, 5-10°, PR, SN Fe, RF								
	6.75	From 6.75m: dark grey				6.75		38	0		6.20-6.77m: SZ, 75°, (possibly)								
	7						VL				6.77m: EW, 0°, 40mm								
	7.80				HW						6.96m: JT, 85°, PR, INF Clay 30mm, SM								
	8	SILTSTONE: grey and dark grey; with fine grained sandstone laminations (<10%). Mittagong Formation.						100	18		7.12m: EW, 0°, 20mm								
	8.40	SANDSTONE: pale grey and grey, fine to medium grained; with siltstone laminations (<20%). Mittagong Formation.				8.40					7.81m: B, 10°, UN, VNR Clay, SM								
	9				SW		M	100	99		7.97m: B, 10°, CU, INF Clay 30mm, SM								
	9.13										8.27m: JT, 75°, PR, CN, RF								
	9.44										8.43m: B, 5°, PR, INF Clay 3mm, SM								
											8.54-8.66m: B x2, 10°, PR, VNR Clay, SM								
											9.13m: B, 0°, PR, INF Clay 5mm, SM								
											9.44m: EW, 0°, 10mm								

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

PLANT: Comacchio Geo 205

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip

METHOD: DT to 0.14m, then AD/T to 1.5m, then HQ3 to 19.52m

CASING: HWT to 1.5m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
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DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 3 of 3

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	SOIL MOISTURE	GRAPHIC	WEATH.				DEPTH (m)	STRENGTH				RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
RL (m)	PS					SW	HW	FW	SW		FR	VL	L	M												
	7.4	[CONT] SANDSTONE: pale grey and grey, fine to medium grained; with siltstone laminations (<20%). Mittagong Formation.				SW				M																
	11					HW		10.74		VL			100	94			10.10-10.95m: EW x8, 10-15°, 10-35mm					PLT	PL(A)=0.06MPa			
	11.45							10.95									11.26m: EW, 10°, 30mm									
	11.61																11.23-11.45m: B, 5-10°, PR, INF Clay, SM, 2-5mm									
	12	SANDSTONE: dark grey; with fine grained sandstone laminations (10%-20%). Mittagong Formation.				SW						91	83			11.61-11.77m: B x6, 5-10°, PR, VNR Clay, SM					PLT	PL(A)=0.64MPa				
	13																12.90m: EW, 0°, 10mm									
	14												100	84			13.70m: B, 5°, PR, VNR Clay, SM					PLT	PL(A)=0.63MPa			
	14																13.74m: CS, 0°, 5mm									
	15	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.				HW		14.30	VL							13.86m: B, 5°, IR, INF Clay 3mm, SM					PLT	PL(A)=0.08MPa				
	15							15.14		L			100	54			14.05m: B, 5°, PR, INF Clay 5mm, SM									
	16																14.03-14.30m: EW, 0-5°, 2mm, 10-25mm					PLT	PL(A)=1.0MPa			
	16.57		SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.														16.32m: JT, 85°, PR, CN, VR					PLT	PL(A)=0.73MPa			
	17												100	100			16.57m: B, 0°, PR, INF Clay 3mm, SM									
	18						FR			M							16.73m: CS, 5°, 3mm					PLT	PL(A)=1.1MPa			
	18.30	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.															17.95m: B, 5°, PR, VNR Clay, SM					PLT	PL(A)=0.47MPa			
	19												100	92			18.22-18.29m: EW x2, 10°					PLT	PL(A)=1.1MPa			
	19.52	Borehole discontinued at 19.52m depth. Target Depth Reached.																								
NOTES: Soil origin is "probable" unless otherwise stated.																										

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

PLANT: Comacchio Geo 205
METHOD: DT to 0.14m, then AD/T to 1.5m, then HQ3 to 19.52m
REMARKS:

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip
CASING: HWT to 1.5m

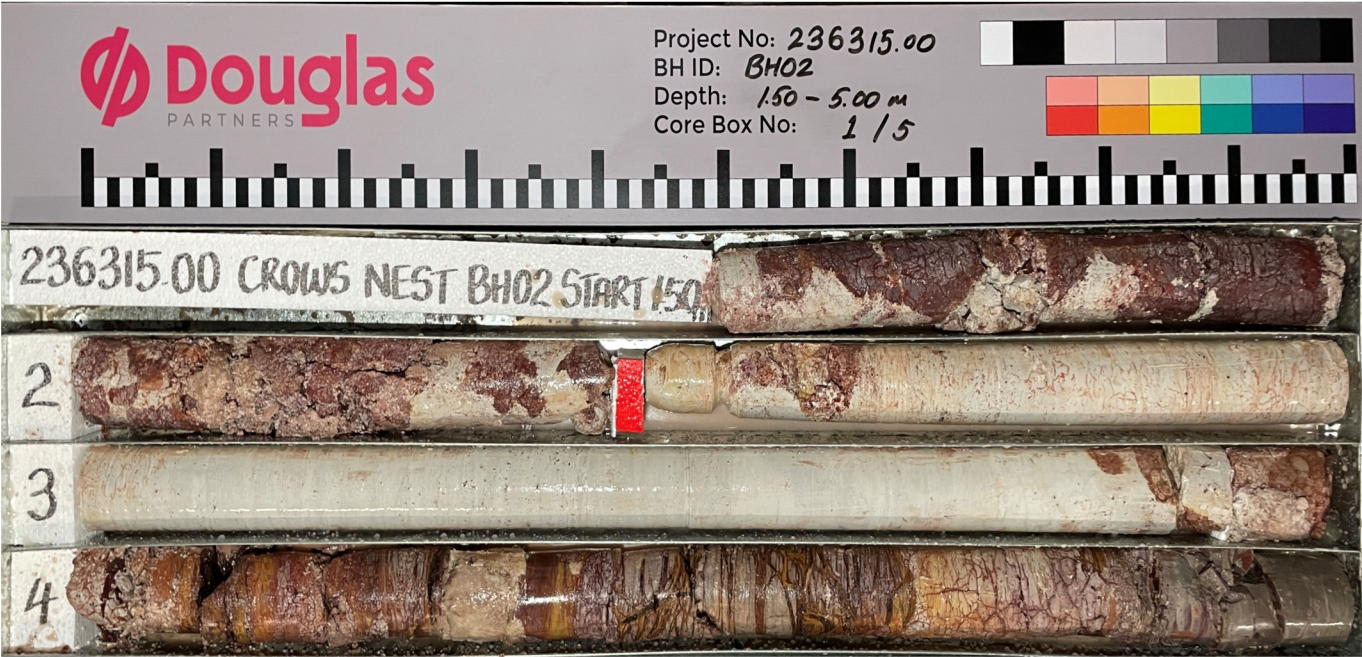
Refer to explanatory notes for symbol and abbreviation definitions

CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333273.7, N:6255705.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 1 of 3



1.50-5.00 m depth



5.00-9.00 m depth

CORE PHOTO LOG

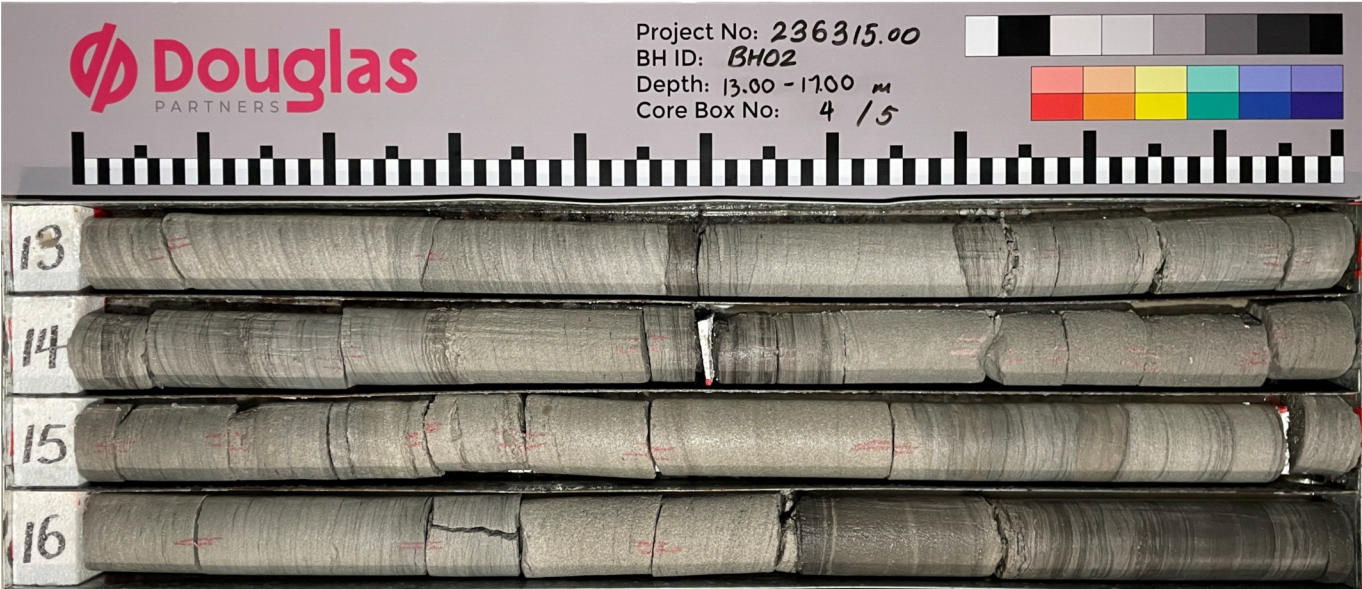
CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333273.7, N:6255705.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 2 of 3



9.00-13.00 m depth



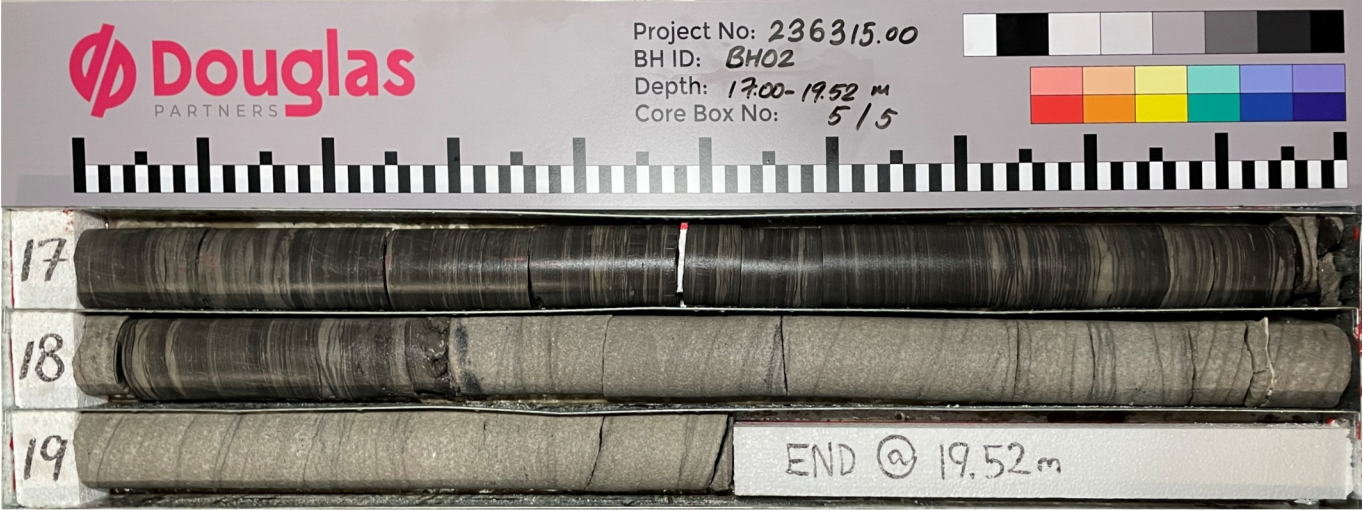
13.00-17.00 m depth

CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333273.7, N:6255705.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH02
PROJECT No: 236315.00
DATE: 17/09/25 - 18/09/25
SHEET: 3 of 3



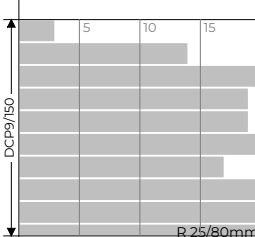
17.00-19.52 m depth

BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 1 of 4

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
RL (m)															
	0.15	CONCRETE SLAB.		NA	NA	NA					0.15	DCP9/150			
	0.30	FILL / SAND trace gravel: pale brown; fine to medium; fine to coarse, igneous and sandstone gravel.		FILL	MC	M			A/ES		0.30				
		Silty CLAY (CI-CH) trace gravel: pale grey mottled red-brown; medium to high plasticity; fine to medium, ironstone gravel.		XWM	H	w<PL			A/ES		0.40				
	1										0.50				
											0.80				
											1.00				
	1.50	Continued as rock log							A		1.30				
											1.50				
	2										2				
											3				
	3										4				
											5				
	4										6				
											7				
	5										8				
											9				
	6														
	7														
															
	8														
															
	9														
															
	75														

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: Comacchio Geo 205

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip

METHOD: DT to 0.15m, then AD/T to 1.5m, then HQ3 to 26.7m

CASING: HWT to 1.35m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 2 of 4

CONDITIONS ENCOUNTERED														SAMPLE			TESTING					
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	SOIL MOISTURE	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
	84	1																		Concrete		
	83		Continued from soil log																			
	1.73		Silty CLAY (CH) trace				XW	1.50	SOIL									PP	300kPa			
	2.00		gravel; pale grey mottled							64	0							PP	380kPa			
	2.12		red-brown; high plasticity;				XW	2.00	SOIL													
			fine to medium, ironstone					2.12										PP	400kPa			
	82		gravel; Extremely weathered															PLT	PL(A)=0.43MPa			
			siltstone.																			
			SILTSTONE: red-brown.				HW											PLT	PL(A)=1.4MPa			
	3		Ashfield Shale.							100	27											
	81																					
							XW	3.24	SEAM													
								3.31														
	4						HW											PLT	PL(A)=2.5MPa			
										92	71							PLT	PL(A)=0.88MPa			
	80																					
	4.40																					
	5																					
	5.15																					
							HW			57	40							PLT	PL(A)=1.1MPa			
	6.00						XW	5.86	SEAM													
	78																					
	6.40						HW	6.40										PLT	PL(A)=0.32MPa			
	7		From 6.75m: dark grey				XW	6.72	SEAM													
							HW	6.88														
	77		7.25m: grey				XW	7.23	SEAM													
	77																					
																				</		

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

PLANT: Comacchio Geo 205

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip

METHOD: DT to 0.15m, then AD/T to 1.5m, then HQ3 to 26.7m

CASING: HWT to 1.35m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 3 of 4

CONDITIONS ENCOUNTERED										SAMPLE			TESTING									
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	SOIL MOISTURE	GRAPHIC	WEATH.		DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE	
RL (m)						PS	DW															
25/09/25	7.4	[CONT] SANDSTONE: pale grey and grey, fine to coarse grained; with siltstone laminations (<20%) . Mittagong Formation.				SW			M	100	56		10.09m: JT, 70°, PR, CN, RF							Bentonite		
	11						HW	10.78		L				10.47m: JT, 40°, PR, CN, RF				PLT	PL(A)=0.33MPa			
	7.3						SW	10.87		M	100	82		10.55m: EW, 0°, 20mm					PLT	PL(A)=0.04MPa		
							HW	11.24		VL				10.69m: B, 10°, PR, INF Clay, SM								
	12						SW	11.51		L				10.94-11.04m: JT, 85°, PR, CN, VR				PLT	PL(A)=0.32MPa			
	7.2	INTERBEDDED SILTSTONE (70%) AND INTERLAMINATED SANDSTONE (30%): grey and dark grey; fine to medium grained sandstone. Mittagong Formation.				XW	12.27		SEAM	100	86	SEAM	11.90m: EW, 0°, 40mm									
	13							12.41						12.27-12.41m: EW, 0°, 140mm								
														12.68m: B, 10°, IR, VR, siltstone clasts inclusions								
	14													12.89m: B, 10°, PR, INF Clay 2mm, SM				PLT	PL(A)=0.46MPa			
														13.12-13.17m: EW x2, 5-10°, 12-30mm								
	7.1	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.											13.40-13.51m: B x2, 5°, PR, CN, VR									
	15													13.82m: B, 0°, PR, VNR Clay, SM				PLT	PL(A)=0.80MPa			
																		PLT	PL(A)=0.88MPa			
	7.0	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.				SW							14.90m: EW, 5°, 20mm									
	16													14.97m: B x2, 0-10°, IR, CN, RF								
														15.41m: B, 5°, PR, INF Clay 2mm, SM								
														15.77m: SS, 10°, 50mm								
														16.19m: JT, 55°, PR, CN, VR				PLT	PL(A)=0.47MPa			
	6.9	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.																				
	17													16.63-16.84m: B x3, 0°, PR, INF Clay, SM, 2-5mm				PLT	PL(A)=1.1MPa			
														16.74-16.88m: F x2, 25°, 5mm displacement				PLT	PL(A)=0.22MPa			
														16.95-17.02m: EW, 5°, 70mm				PLT	PL(A)=0.12MPa			
														17.03-17.20m: JT x2, 65-75°, PR, CN, RF								
	6.8	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.				SW	16.95	SEAM	100	52	SEAM		17.17-17.41m: EW x2, 0°, 20-30mm									
	18						XW	17.02		L												
	6.7	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.																				
	19																					
	6.6	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.				FR			H	100	100										Bentonite	
	19													19.15m: B, 0°, PR, VNR Clay, SM								
														19.44m: B, 10°, CU, INF Clay, SM, 4mm								
	6.5	SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.																				

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

PLANT: Comacchio Geo 205
METHOD: DT to 0.15m, then AD/T to 1.5m, then HQ3 to 26.7m
REMARKS:

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip
CASING: HWT to 1.35m

BOREHOLE LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 4 of 4

CONDITIONS ENCOUNTERED														SAMPLE			TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered)	SOIL MOISTURE	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	6.4	[CONT] SANDSTONE: pale grey, fine to coarse grained. Hawkesbury Sandstone.							100	98		20.30m: B, 0°, PR, VNR Clay, SM								
	21																PLT	PL(A)=1.0MPa		
	6.3								100	100		21.54m: B, 10°, PR, VNR Clay, SM					PLT	PL(A)=1.6MPa		
	22																			
	6.2																			
	23								100	100		23.74m: B, 5°, PR, VNR Clay, SM					PLT	PL(A)=1.1MPa		
	6.1					FR		H				24.19m: B, 10°, PR, INF Clay 8mm, SM								
	24																PLT	PL(A)=1.0MPa		
	6.0								100	100										
	25																PLT	PL(A)=1.1MPa		
	5.9																			
	26								100	100							PLT	PL(A)=1.6MPa		
	5.8																			
	27	Borehole discontinued at 26.70m depth. Target Depth Reached.																		
	5.7																			
	28																			
	5.6																			
	29																			
	5.5																			

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

PLANT: Comacchio Geo 205
METHOD: DT to 0.15m, then AD/T to 1.5m, then HQ3 to 26.7m
REMARKS:

OPERATOR: Ground Test (GM)

LOGGED: C. S. Yip
CASING: HWT to 1.35m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 1 of 4



1.50-5.00 m depth



5.00-9.00 m depth

CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 2 of 4



9.00-13.00 m depth



13.00-17.00 m depth

CORE PHOTO LOG

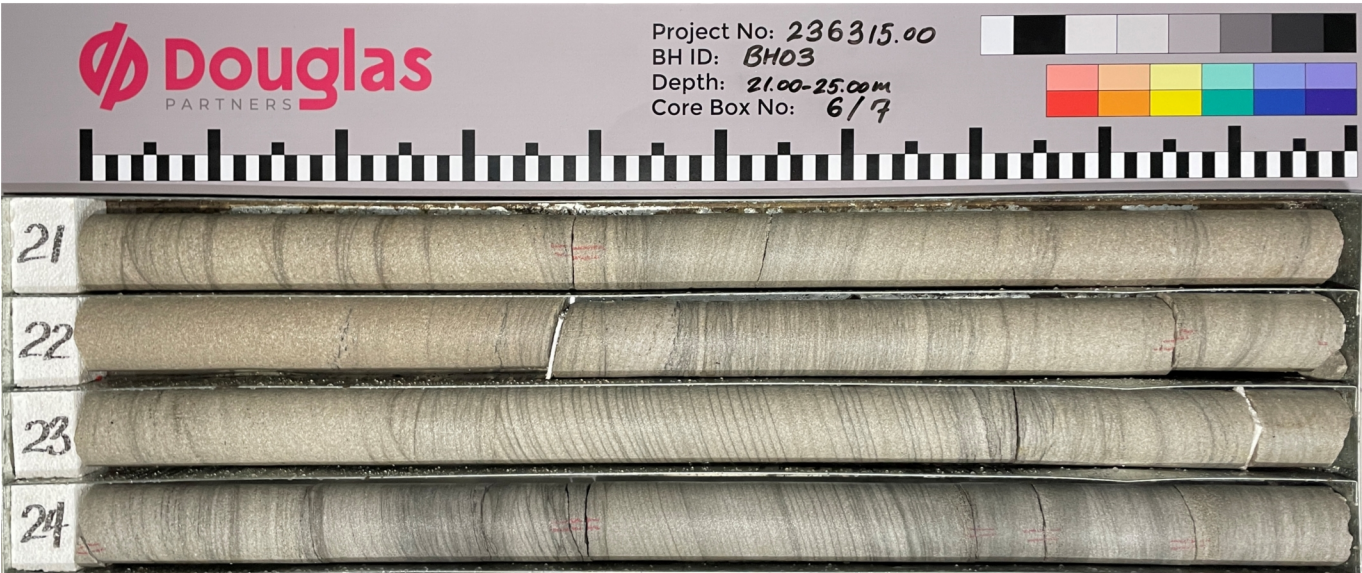
CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 3 of 4



17.00-21.00 m depth



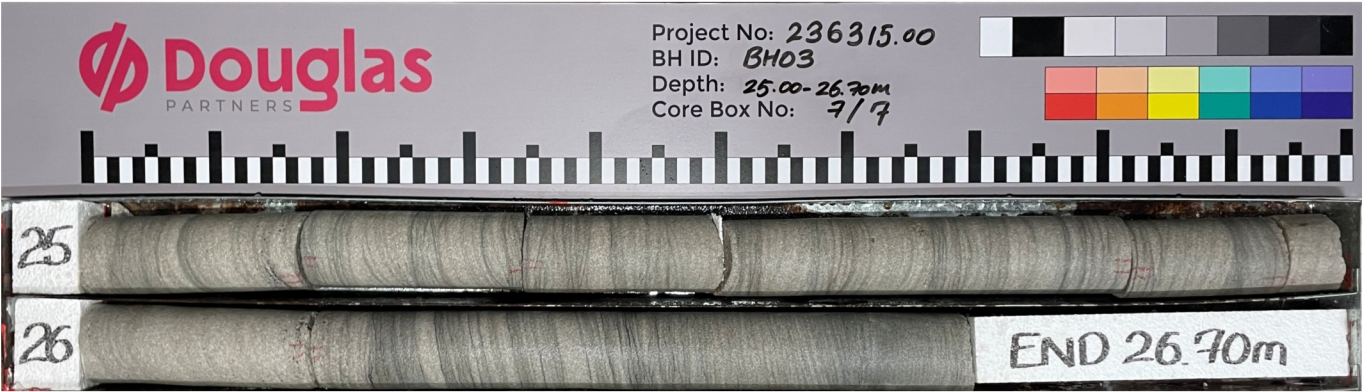
21.00-25.00 m depth

CORE PHOTO LOG

CLIENT: Prosper Atrium Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 402-420 Pacific Hwy, Crows Nest, NSW 2065

SURFACE LEVEL: 84.4 AHD
COORDINATE: E:333278.2, N:6255733.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH03
PROJECT No: 236315.00
DATE: 15/09/25 - 16/09/25
SHEET: 4 of 4

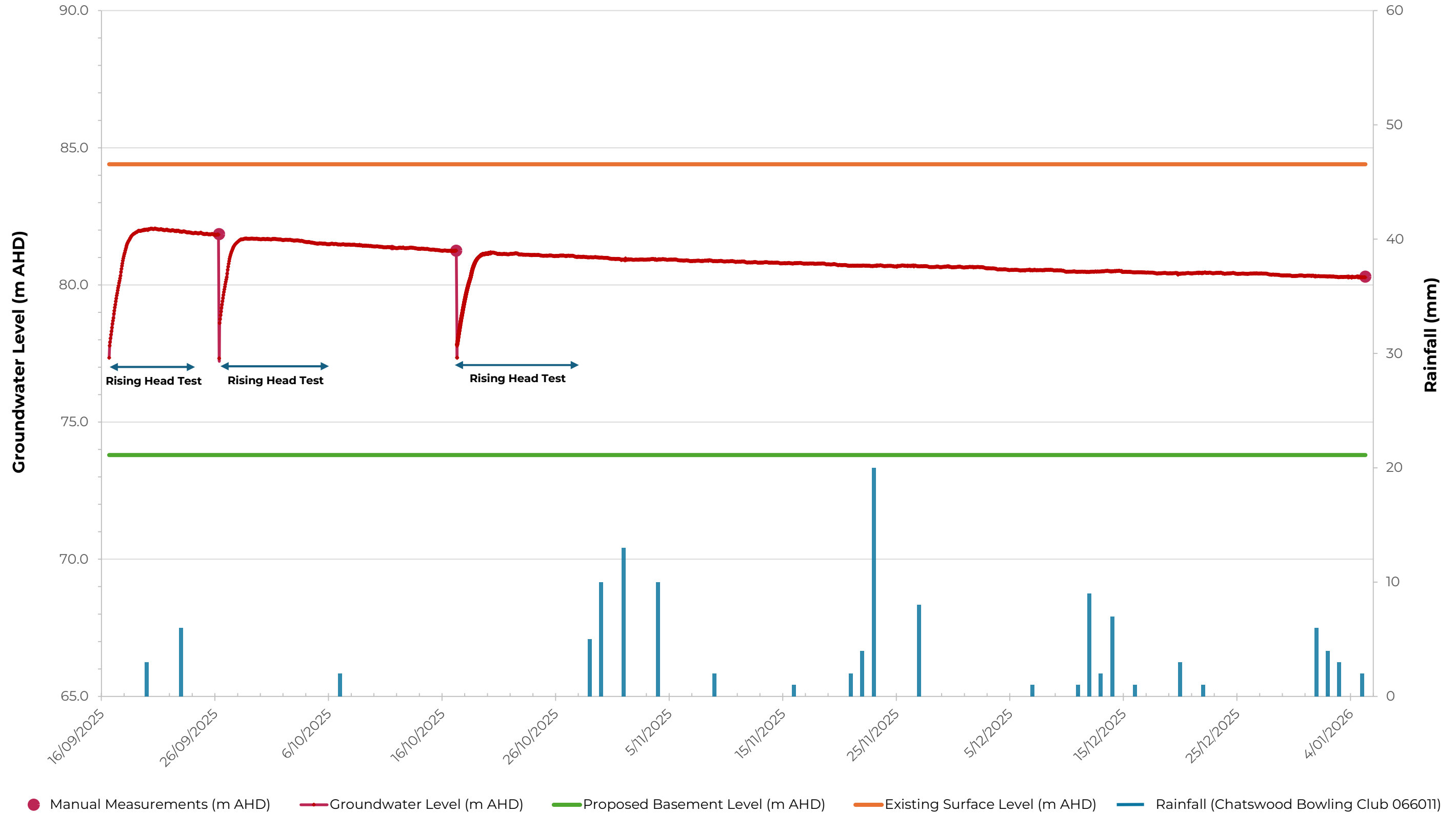


25.00-26.70 m depth

Appendix D

Hydrographs

BH01



CLIENT: Prosper Atrium Pty Ltd

OFFICE: Sydney

SURFACE LEVEL: 84.4 m AHD

DRAWN BY: Y. Gim

DATE: 5 January 2026

Groundwater Monitoring 16/09/2025 to 5/01/2026

Prosper Atrium Pty Ltd

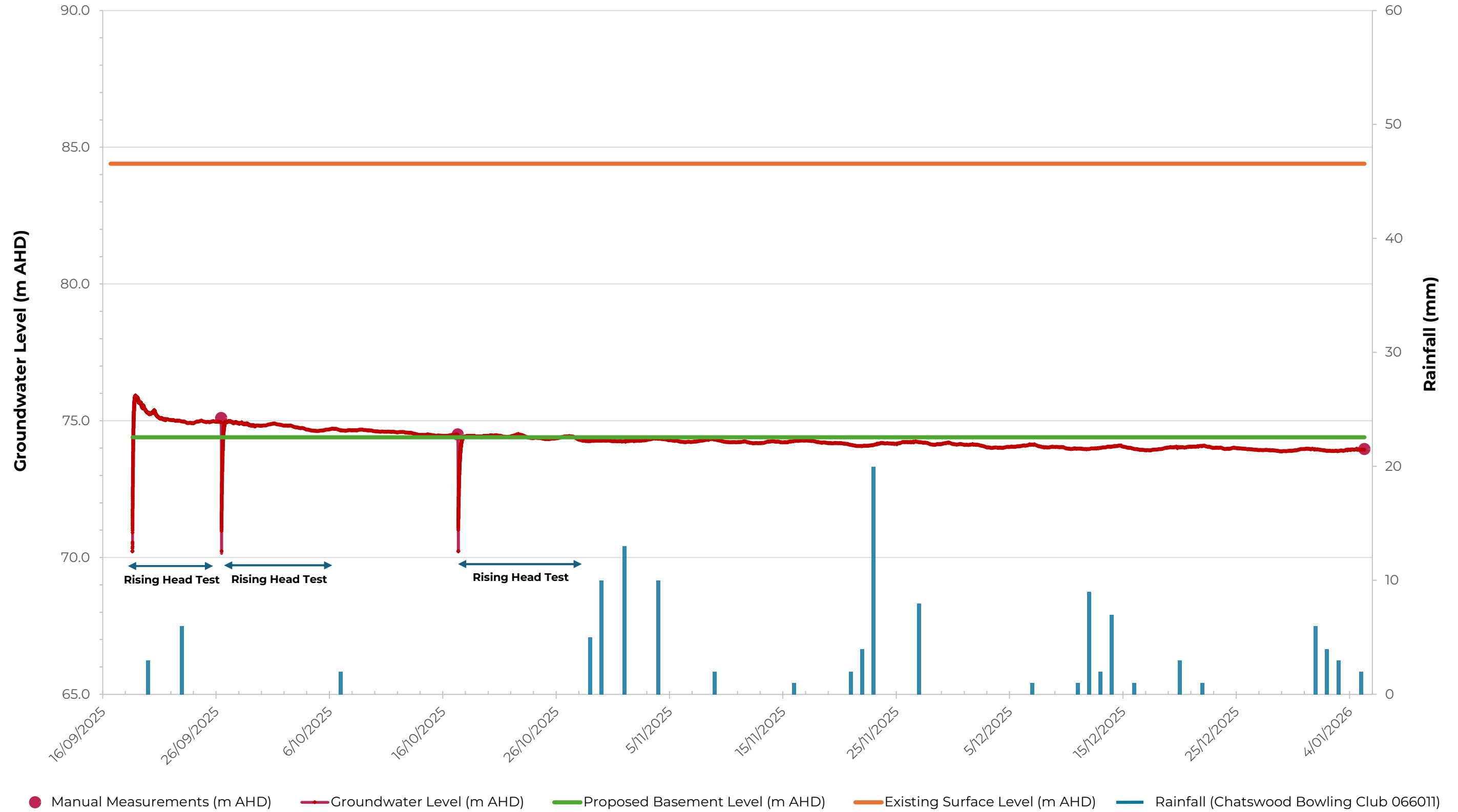
402-420 Pacific Highway, Crows Nest NSW

PROJECT NO: 236315.00

FIGURE NO: 1 of 3

REVISION: Rev0

BH02



CLIENT: Prosper Atrium Pty Ltd

OFFICE: Sydney

SURFACE LEVEL: 84.4 m AHD

DRAWN BY: Y. Gim

DATE: 5 January 2026

Groundwater Monitoring 16/09/2025 to 5/01/2026

Prosper Atrium Pty Ltd

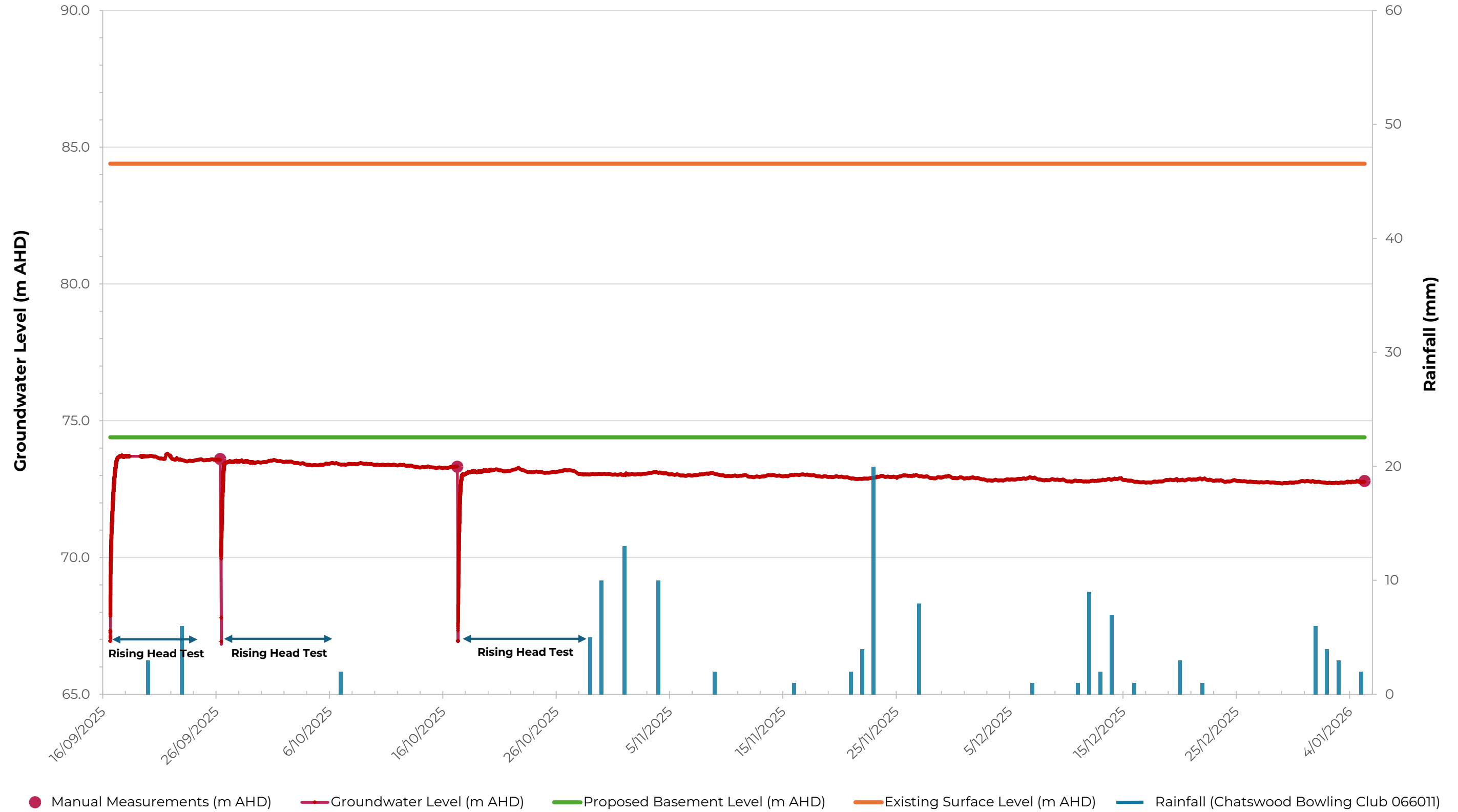
402-420 Pacific Highway, Crows Nest NSW

PROJECT NO: 236315.00

FIGURE NO: 2 of 3

REVISION: Rev0

BH03



CLIENT: Prosper Atrium Pty Ltd

OFFICE: Sydney

SURFACE LEVEL: 84.4 m AHD

DRAWN BY: Y. Gim

DATE: 5 January 2026

Groundwater Monitoring 16/09/2025 to 5/01/2026

Prosper Atrium Pty Ltd

402-420 Pacific Highway, Crows Nest NSW

PROJECT NO: 236315.00

FIGURE NO: 3 of 3

REVISION: Rev0

Appendix E

Hydraulic testing results

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd	Project No:	236315.00
Project:	Proposed Mixed Use Development	Test date:	16-Sep-25
Location:	402-420 Pacific Highway, Crows Nest	Tested by:	CSY

Test Location

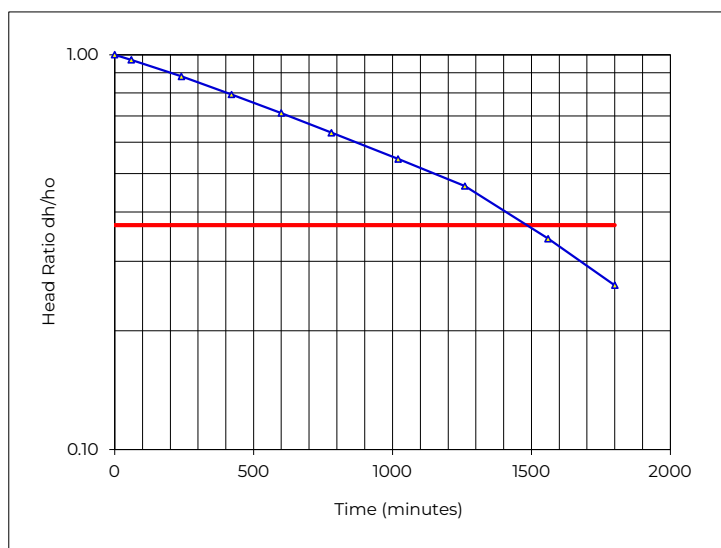
Description:	Rising Head Test in well installed within borehole	Test No.	BH01-1
Material type:	Siltstone	Easting:	333256.6 m
		Northing	6255744.5 m
		Surface Level:	84.4 m AHD

Details of Well Installation

Effective diameter (2re)	96 mm	Depth to water before test	2.20 m
borehole diameter (2R)	96 mm	Depth to water at start of test	6.61 m
Effective Length of well screen (Le)	4.00 m	Depth of top of gravel pack	3.50 m
		Depth of base of gravel pack	7.50 m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0	6.61	4.41	1.000
60	6.48	4.28	0.971
240	6.09	3.89	0.882
420	5.70	3.50	0.794
600	5.34	3.14	0.712
780	5.00	2.80	0.635
1020	4.60	2.40	0.544
1260	4.25	2.05	0.465
1560	3.71	1.51	0.342
1800	3.35	1.15	0.261



To = 1492 mins
89502 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

$$k = [r^2 \ln(L_e/R)] / 2L_e T_o$$

where r = radius of casing

R = radius of well screen

L_e = length of well screen

T_o = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity

k = 1.4E-08 m/sec
= 0.001 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	26-Sep-25
Tested by:	SAF

Test Location

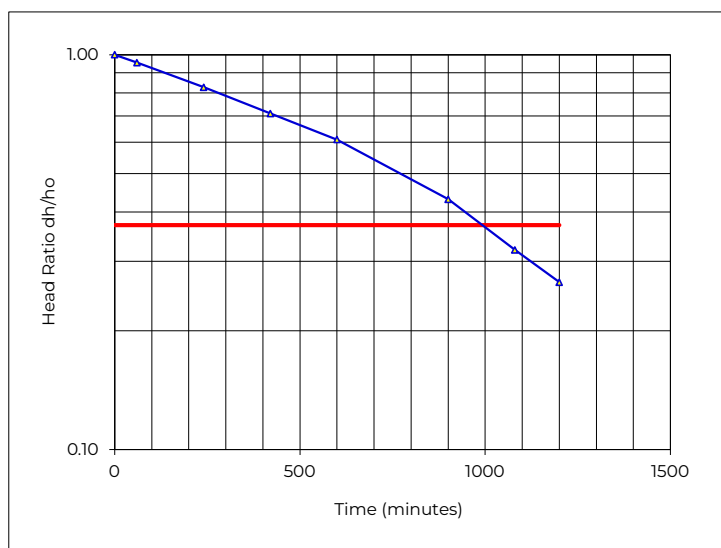
Description:	Rising Head Test in well installed within borehole
Material type:	Siltstone

Test No.	BH01-2	
Easting:	333256.6	m
Northing	6255744.5	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	2.60	m
borehole diameter (2R)	96	mm	Depth to water at start of test	5.50	m
Effective Length of well screen (Le)	4.00	m	Depth of top of gravel pack	3.50	m
			Depth of base of gravel pack	7.50	m

Test Results

[illegible]

To = 1000 mins
59988 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

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

where r = radius of casing

R = radius of well screen

Le = length of well screen

To = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity

k = 2.1E-08 m/sec
= 0.002 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	17-Oct-25
Tested by:	CSY

Test Location

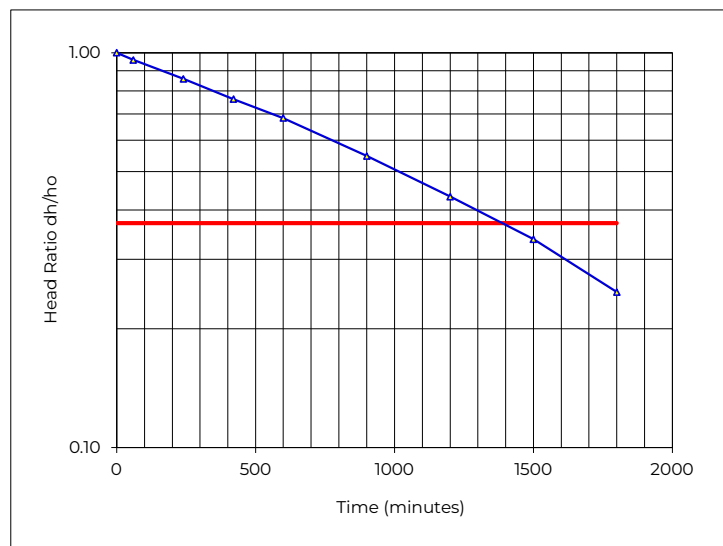
Description:	Rising Head Test in well installed within borehole
Material type:	Siltstone

Test No.	BH01-3	
Easting:	333256.6	m
Northing	6255744.5	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	3.15	m
borehole diameter (2R)	96	mm	Depth to water at start of test	6.62	m
Effective Length of well screen (Le)	4.00	m	Depth of top of gravel pack	3.50	m
			Depth of base of gravel pack	7.50	m

Test Results

[illegible]

To = 1396 mins
83760 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

$$k = [r^2 \ln(L_e/R)]/2L_e$$
 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 = 1.5E-08 m/sec
= 0.001 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	18-Sep-25
Tested by:	CSY

Test Location

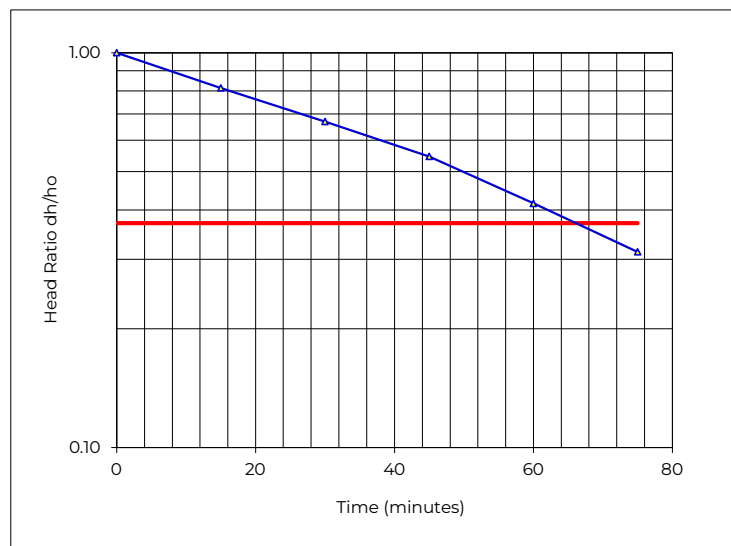
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH02-1	
Easting:	333273.7	m
Northing	6255705.2	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	9.30	m
borehole diameter (2R)	96	mm	Depth to water at start of test	13.29	m
Effective Length of well screen (Le)	5.20	m	Depth of top of gravel pack	7.40	m
			Depth of base of gravel pack	14.50	m

Test Results

[illegible]

To = 67 mins
4002 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 = 2.6E-07 m/sec
= 0.022 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	26-Sep-25
Tested by:	SAF

Test Location

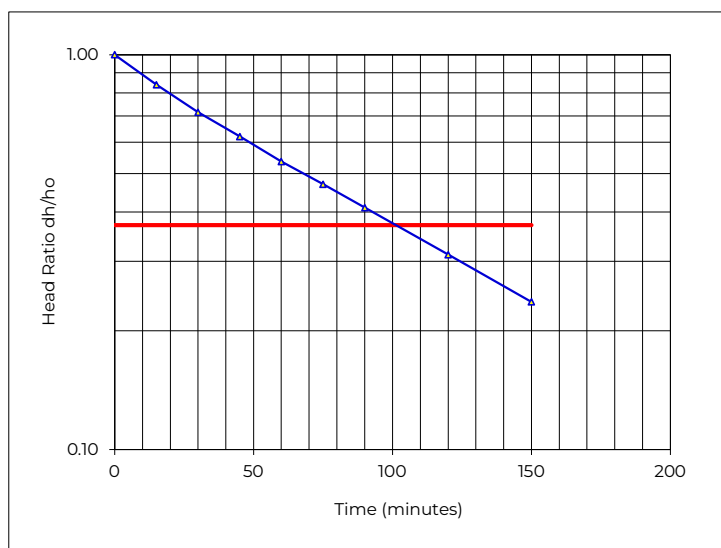
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH02-2	
Easting:	333273.7	m
Northing	6255705.2	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	9.50	m
borehole diameter (2R)	96	mm	Depth to water at start of test	13.43	m
Effective Length of well screen (Le)	4.60	m	Depth of top of gravel pack	7.40	m
			Depth of base of gravel pack	14.50	m

Test Results

[illegible]

To = 103 mins
6180 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 = 1.8E-07 m/sec
= 0.016 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	17-Oct-26
Tested by:	CSY

Test Location

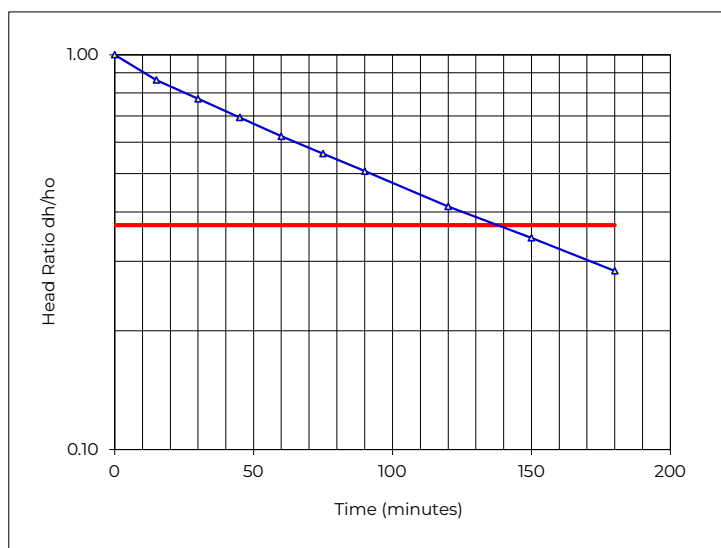
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH02-3	
Easting:	333273.7	m
Northing	6255705.2	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	9.90	m
borehole diameter (2R)	96	mm	Depth to water at start of test	13.39	m
Effective Length of well screen (Le)	4.60	m	Depth of top of gravel pack	7.40	m
			Depth of base of gravel pack	14.50	m

Test Results

[illegible]

To = 139 mins
8340 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

$$k = [r^2 \ln(L_e/R)]/2L_e$$
 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 = 1.4E-07 m/sec
= 0.012 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	16-Sep-25
Tested by:	CSY

Test Location

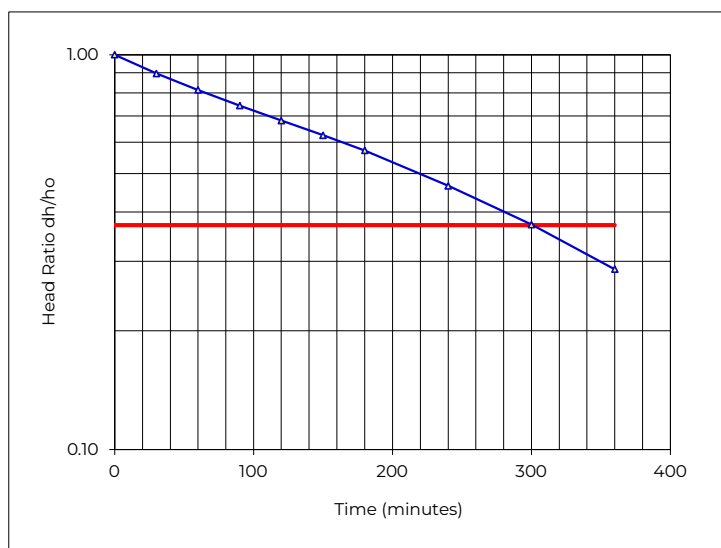
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH03-1	
Easting:	333278.2	m
Northing	6255733.4	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	10.80	m
borehole diameter (2R)	96	mm	Depth to water at start of test	14.19	m
Effective Length of well screen (Le)	7.20	m	Depth of top of gravel pack	10.80	m
			Depth of base of gravel pack	18.00	m

Test Results

[illegible]

To = 301 mins
18060 secs

Theory:

Falling Head Permeability calculated using equation by Hvorslev

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

where r = radius of casing

R = radius of well screen

Le = length of well screen

To = time taken to rise or fall to 37% of initial change

Hydraulic Conductivity

k = 4.4E-08 m/sec
= 0.004 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	26-Sep-25
Tested by:	SAF

Test Location

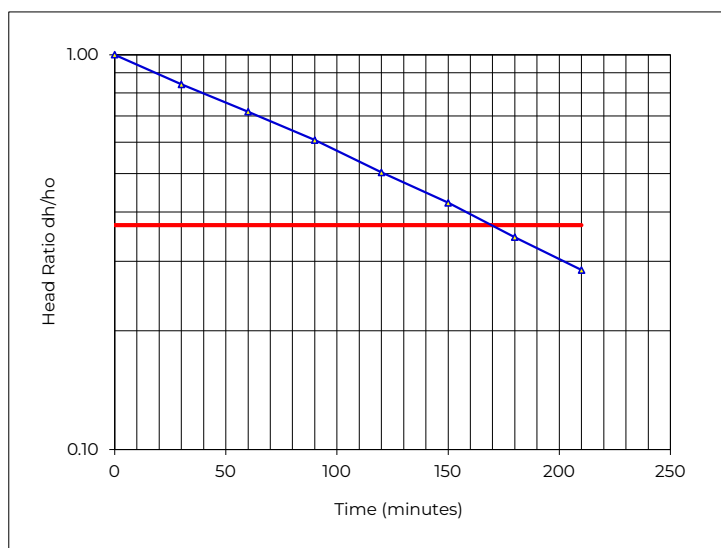
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH03-2	
Easting:	333278.2	m
Northing	6255733.4	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	10.80	m
borehole diameter (2R)	96	mm	Depth to water at start of test	14.45	m
Effective Length of well screen (Le)	7.20	m	Depth of top of gravel pack	10.80	m
			Depth of base of gravel pack	18.00	m

Test Results

[illegible]

To = 171 mins
10260 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 = 7.8E-08 m/sec
= 0.007 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosper Atrium Pty Ltd
Project:	Proposed Mixed Use Development
Location:	402-420 Pacific Highway, Crows Nest

Project No:	236315.00
Test date:	26-Sep-25
Tested by:	SAF

Test Location

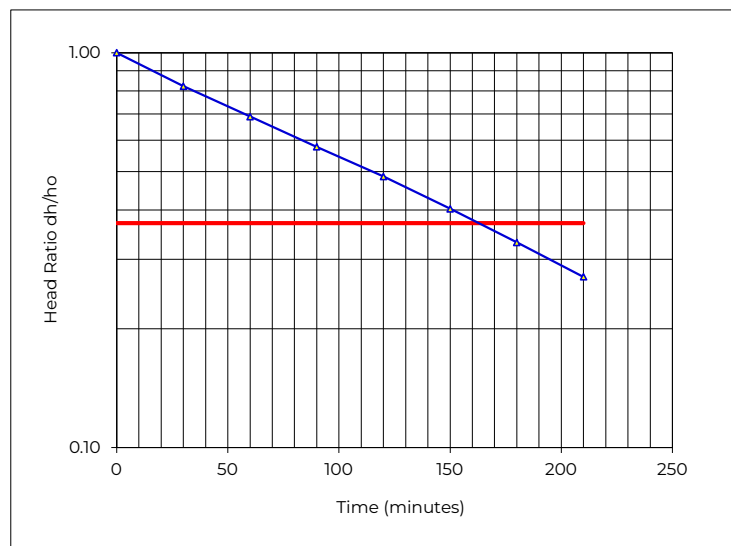
Description:	Rising Head Test in well installed within borehole
Material type:	Sandstone

Test No.	BH03-3	
Easting:	333278.2	m
Northing	6255733.4	m
Surface Level:	84.4	m AHD

Details of Well Installation

Effective diameter (2re)	96	mm	Depth to water before test	11.08	m
borehole diameter (2R)	96	mm	Depth to water at start of test	17.07	m
Effective Length of well screen (Le)	6.90	m	Depth of top of gravel pack	10.80	m
			Depth of base of gravel pack	18.00	m

Test Results

[illegible]

To = 164 mins
9840 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 = 8.4E-08 m/sec
= 0.007 m/day

Appendix F

Water quality summary table

Table F1: Summary of Laboratory Results – Groundwater

		Metals - Total								Metals - Dissolved								TRH				BTEX					
		Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	F1 (C6-Cl0)-BTEX	F2 (>Cl0-Cl6 less Naphthalene)	F3 (<Cl6-Cl4)	F4 (<Cl4-Cl0)	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes
	PQL	1	0.1	1	1	1	0.05	1	1	1	0.1	1	1	1	0.05	1	1	10	50	100	100	1	1	1	1	2	1
NHMRC (2012) Recreation		100	20	500	20,000	100	10	200	30000	100	20	20,000	50	10	200							10	8,000	3,000			6,000
ANZG (2018) 95% LOP Fresh		13	0.3 ^a	1	1.4	7.2 ^a	0.6	18.1 ^a	13.2 ^a	13	0.3 ^a	1	1.4	7.2 ^a	0.6	18.1 ^a	13.2 ^a					950	180	80	350	75	
HEPA (2025) 95% LOP Fresh																											
Physical Parameters																											
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
BH01	26/09/25	1	0.1	4	160	4	<0.05	20	170	<1	<0.1	<1	130	4	<0.05	17	170	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1
BH03	26/09/25	7	0.3	14	54	16	<0.05	26	180	2	0.2	<1	5	<1	<0.05	11	60	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1

Notes:

- a

Hardness adjusted criteria
- No criterion / not defined / not tested / not applicable
- *

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

Not limiting
- PQL

Practical quantitation limit
- Shaded cell is exceedance of guideline value
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- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Clay 2-4m
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]
- HEPA (2025) PFAS National Environmental Management Plan, Version 3.0 99% level of protection for Fresh water aquatic ecosystems
- NHMRC (2008) Guidelines for Managing Risk in Recreational Water
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection
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- ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered
- ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table F1: Summary of Laboratory Results – Groundwater

		PAH															OCP															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Naphthalene	Benzo(a)pyrene (BaP)	Benzo(b)fluoranthene	Benzo(h)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene	Sum of detected PAH	DDE	DDT	DDD	Aldrin	Dieldrin	Aldrin + Dieldrin (calculated)	alpha-chlordane	gamma-Chlordane	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Endrin Aldehyde	Hepachlor	Hepachlor Epoxide
	PQL	0.01	0.01	0.01	0.01	1	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001
NHMRC (2012) Recreation							0.1												90				3								3	
ANZG (2018) 95% LOP Fresh				0.4		16	0.2					1.4			2				0.01		0.001	0.01							0.02		0.09	
HEPA (2025) 95% LOP Fresh																																
Physical Parameters																																
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH01	26/09/25	0.01	<0.01	0.02	<0.01	<1	<0.01	<0.02	<0.01	<0.01	<0.01	0.06	0.02	<0.01	0.16	0.05	0.32	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
BH03	26/09/25	0.02	<0.01	0.01	<0.01	<1	<0.01	<0.02	<0.01	<0.01	<0.01	0.03	0.03	<0.01	0.13	0.03	0.32	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:

- a Hardness adjusted criteria
 - No criterion / not defined / not tested / not applicable
 - * QA/QC replicate of sample listed directly below the primary sample
 - NL Not limiting
 - PQL Practical quantitation limit
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- ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table F1: Summary of Laboratory Results – Groundwater

									OPP																PCB								
		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	Bonnel (fenchlorphos)	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
	PQL	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	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
NHMRC (2012) Recreation							100		300	100	100		40	50	70	40		70	70	700	200	7	60	5									
ANZG (2018) 95% LOP Fresh	0.1	0.005					0.2		0.02		0.01		0.01		0.15			0.2		0.05	0.004							0.6		0.03			
HEPA (2025) 95% LOP Fresh																																	
Physical Parameters																																	
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
BH01	26/09/25	<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	<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
BH03	26/09/25	<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	<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

Notes:

- a

Hardness adjusted criteria
- No criterion / not defined / not tested / not applicable
- *

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- NL

Not limiting
- PQL

Practical quantitation limit
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- ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table F1: Summary of Laboratory Results – Groundwater

		VOC (excluding BTEX)																																	
		1,1,2- tetrachloroethane	1,1- trichloroethane	1,1,2,2- tetrachloroethane	tetrachloroethene	1,1,2- trichloroethane	1,1,2- trichloroethylene	1,1-dichloroethane	1,1-Dichloroethene	1,1- dichloropropane	1,2,3- trichlorobenzene	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	Bromodichlorome thane	Bromodorm	carbon tetrachloride	Chloroethane	Vinyl Chloride	Chloroform	Chloromethane
	PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	10	1	10
NHMRC (2012) Recreation					500				300							15,000	30					400									30		3		
ANZG (2018) 95% LOP Fresh			270	400	70	6,500	330		700		3		85			160	1,900	900		260	1,100	60									240		100	770	
HEPA (2025) 95% LOP Fresh																																			
Physical Parameters																																			
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH01	26/09/25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	
BH03	26/09/25	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	2	<10	

Notes:

a Hardness adjusted criteria

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

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

NL Not limiting

PQL Practical quantitation limit

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

NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Clay 2-4m

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

HEPA (2025) PFAS National Environmental Management Plan, Version 3.0 99% level of protection for Fresh water aquatic ecosystems

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

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ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table F1: Summary of Laboratory Results – Groundwater

																						PFAS							Nutrients						
		cis-1,2-dichloroethene	cis-1,3-dichloropropene	Isopropylbenzene (Cumene)	Cyclohexane	dibromochloromethane	Dibromomethane	Dichlorodifluoroethane	1,2-dibromoethane	hexachlorobutadiene	Bromomethane	Monochlorobenzene	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichlorofluoromethane	Sum of detected VOC	PFOs	PFOA	PFHxS	Perfluorobutanesulfonic acid (PFBS)	6:2 FTS	8:2 FTS	Sum of detected PFAS	Nitrogen	Ammonia as N	TKN in water	Nitrate as N	Nitrite as N	NOx as N	Organic Nitrogen as N
	PQL	1	1	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	100	5	100	5	5	5	200
NHMRC (2012) Recreation									10	7	10	3,000				300							10									113,000	9,000		
ANZG (2018) 95% LOP Fresh				30								55																		900			1,100		
HEPA (2025) 95% LOP Fresh																						0.13	220												
Physical Parameters																																			
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH01	26/09/25	<1	<1	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1	0.001	<0.0002	0.0006	<0.0004	0.025	<0.0004	0.027	300	79	300	20	<5	20	<200
BH03	26/09/25	<1	<1	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	2	0.001	0.0006	0.0005	0.0007	0.029	<0.0004	0.033	500	50	500	<5	10	10	500

Notes:

- a Hardness adjusted criteria
 - No criterion / not defined / not tested / not applicable
 - * QA/QC replicate of sample listed directly below the primary sample
 - 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 Clay 2-4m
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems (NB: 99% level of protection adopted for bioaccumulative chemicals)
- HEPA (2025) PFAS National Environmental Management Plan, Version 3.0 99% level of protection for Fresh water aquatic ecosystems
- NHMRC (2008) Guidelines for Managing Risk in Recreational Water
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection
- Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.
- ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m+p); DGV for Cr(VI) adopted for total chromium; DGV for As(V) adopted for total arsenic
- ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered
- ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table F1: Summary of Laboratory Results – Groundwater

			Physical Parameters				Anions & Cations						Anions & Cations - Dissolved					Microbiological
		Phosphorous	Total dissolved solids	Total suspended solids	pH	Conductivity	Bicarbonate Alkalinity as CaCO3	Chloride	Hydroxide Alkalinity (OH-) as CaCO3	Ionic Balance	Sulphate	Total Alkalinity as CaCO3	Hardness	Calcium	Magnesium	Potassium	Sodium	Total coliforms
	PQL	50	5,000	5,000	-	-	5,000	1000	5,000		1000	5,000	500	500	500	500	500	18
NHMRC (2012) Recreation					6.5-8.5													<PQL
ANZG (2018) 95% LOP Fresh																		<PQL
HEPA (2025) 95% LOP Fresh																		
Physical Parameters				50,000	6.0 - 8.0	125 - 2200												
Sample ID	Sample Date	µg/L	µg/L	µg/L	-		µg/L	µg/L	µg/L	mg/kg	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	MPN/100mL
BH01	26/09/25	<50	480,000	290,000	4.33	795.00	5,000	130,000	<5000	110,000	66,000	5,000	69000	12,000	9,600	2,000	120,000	<18
BH03	26/09/25	200	190,000	880,000	5.26	291.60	35,000	48,000	<5000	-20000	12,000	35,000	39000	10,000	3,000	2,000	32,000	<18

Notes:

- aHardness adjusted criteria
- No criterion / not defined / not tested / not applicable
- *QA/QC replicate of sample listed directly below the primary sample
- NLNot limiting
- PQLPractical 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 Clay 2-4m
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]
- HEPA (2025) PFAS National Environmental Management Plan, Version 3.0 99% level of protection for Fresh water aquatic ecosystems
- NHMRC (2008) Guidelines for Managing Risk in Recreational Water
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection
- Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.
- ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic
- ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered
- ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Appendix G

Laboratory reports

CERTIFICATE OF ANALYSIS 391725

Client Details

Client	Douglas Partners Pty Ltd
Attention	Yeongbin Gim
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>236315.00, Crows Nest</u>
Number of Samples	2 Water
Date samples received	26/09/2025
Date completed instructions received	26/09/2025

Analysis Details

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

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

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

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

Report Details

Date results requested by	03/10/2025
Date of Issue	03/10/2025

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Results Approved By

Diego Bigolin, Inorganics Supervisor
 Giovanni Agosti, Group Technical Manager
 Loren Bardwell, Development Chemist
 Nancy Zhang, Laboratory Manager, Sydney
 Sean McAlary, Senior Chemist
 Tabitha Roberts, Senior Chemist
 Timothy Toll, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

VOCs in water			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date Extracted	-	30/09/2025	30/09/2025
Date Analysed	-	01/10/2025	01/10/2025
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	<10	<10
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	<1	2
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	<1
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	<1
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1

VOCs in water			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Bromoform	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	101	101
Surrogate Toluene-d8	%	96	96
Surrogate 4-Bromofluorobenzene	%	107	106

vTRH(C6-C10)/BTEXN in Water			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	30/09/2025	30/09/2025
Date analysed	-	01/10/2025	01/10/2025
TRH C ₆ - C ₉	µg/L	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	101	101
Surrogate Toluene-d8	%	96	96
Surrogate 4-Bromofluorobenzene	%	107	106

svTRH (C10-C40) in Water			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	29/09/2025	29/09/2025
Date analysed	-	29/09/2025	29/09/2025
TRH C ₁₀ - C ₁₄	µg/L	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	96	98

PAHs in Water - Trace Level			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	29/09/2025	29/09/2025
Date analysed	-	01/10/2025	01/10/2025
Naphthalene	µg/L	<0.02	0.07
Acenaphthylene	µg/L	<0.01	<0.01
Acenaphthene	µg/L	0.01	0.02
Fluorene	µg/L	0.02	0.03
Phenanthrene	µg/L	0.16	0.13
Anthracene	µg/L	0.02	0.01
Fluoranthene	µg/L	0.06	0.03
Pyrene	µg/L	0.05	0.03
Benzo(a)anthracene	µg/L	<0.01	<0.01
Chrysene	µg/L	<0.01	<0.01
Benzo(b,j+k)fluoranthene	µg/L	<0.02	<0.02
Benzo(a)pyrene	µg/L	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01
Benzo(a)pyrene TEQ	µg/L	<0.05	<0.05
Total +ve PAH's	µg/L	0.32	0.32
Surrogate <i>p</i> -Terphenyl-d14	%	83	81

OCPs in Water - Trace Level			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	29/09/2025	29/09/2025
Date analysed	-	01/10/2025	01/10/2025
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	%	86	85

OP in water LL ANZECCF/ADWG			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	29/09/2025	29/09/2025
Date analysed	-	01/10/2025	01/10/2025
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	%	86	85

PCBs in Water - Trace Level			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	29/09/2025	29/09/2025
Date analysed	-	01/10/2025	01/10/2025
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	%	67	71

Total Phenolics in Water			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date extracted	-	30/09/2025	30/09/2025
Date analysed	-	30/09/2025	30/09/2025
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05

HM in water - dissolved			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	29/09/2025	29/09/2025
Date analysed	-	29/09/2025	29/09/2025
Arsenic-Dissolved	µg/L	<1	2
Cadmium-Dissolved	µg/L	<0.1	0.2
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	130	5
Lead-Dissolved	µg/L	4	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	17	11
Zinc-Dissolved	µg/L	170	60

HM in water - total			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	29/09/2025	29/09/2025
Date analysed	-	29/09/2025	29/09/2025
Arsenic-Total	µg/L	1	7
Cadmium-Total	µg/L	0.1	0.3
Chromium-Total	µg/L	4	14
Copper-Total	µg/L	160	54
Lead-Total	µg/L	4	16
Mercury-Total	µg/L	<0.05	<0.05
Nickel-Total	µg/L	20	26
Zinc-Total	µg/L	170	180

Metals in Waters - Acid extractable			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	29/09/2025	29/09/2025
Date analysed	-	29/09/2025	29/09/2025
Phosphorus - Total	mg/L	<0.05	0.2

Miscellaneous Inorganics			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	29/09/2025	29/09/2025
Date analysed	-	29/09/2025	29/09/2025
Total Dissolved Solids (grav)	mg/L	480	190
Total Suspended Solids	mg/L	290	880
Ammonia as N in water	mg/L	0.079	0.05
Nitrate as N in water	mg/L	0.02	<0.005
Nitrite as N in water	mg/L	<0.005	0.01
Total Nitrogen in water	mg/L	0.3	0.5
TKN in water	mg/L	0.3	0.5
Organic Nitrogen as N	mg/L	<0.2	0.5
NOx as N in water	mg/L	0.02	0.01
Phosphate as P in water	mg/L	0.04	0.009

PFAS in Water TRACE Short			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	30/09/2025	30/09/2025
Date analysed	-	30/09/2025	30/09/2025
Perfluorobutanesulfonic acid	µg/L	<0.0004	0.0007
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0006	0.0005
Perfluorooctanesulfonic acid PFOS	µg/L	0.001	0.001
Perfluorooctanoic acid PFOA	µg/L	<0.0002	0.0006
6:2 FTS	µg/L	0.025	0.029
8:2 FTS	µg/L	<0.0004	<0.0004
Surrogate ¹³ C ₈ PFOS	%	98	99
Surrogate ¹³ C ₂ PFOA	%	114	117
Extracted ISTD ¹³ C ₃ PFBS	%	90	95
Extracted ISTD ¹⁸ O ₂ PFHxS	%	96	97
Extracted ISTD ¹³ C ₄ PFOS	%	88	86
Extracted ISTD ¹³ C ₄ PFOA	%	93	92
Extracted ISTD ¹³ C ₂ 6:2FTS	%	143	176
Extracted ISTD ¹³ C ₂ 8:2FTS	%	149	169
Total Positive PFHxS & PFOS	µg/L	0.002	0.002
Total Positive PFOS & PFOA	µg/L	0.001	0.0020
Total Positive PFAS	µg/L	0.027	0.032

Ion Balance			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date prepared	-	02/10/2025	02/10/2025
Date analysed	-	02/10/2025	02/10/2025
Calcium - Dissolved	mg/L	12	10
Potassium - Dissolved	mg/L	2	2
Sodium - Dissolved	mg/L	120	32
Magnesium - Dissolved	mg/L	9.6	3
Hardness (calc) equivalent CaCO ₃	mg/L	69	39
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	35
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	5	35
Sulphate, SO ₄	mg/L	66	12
Chloride, Cl	mg/L	130	48
Ionic Balance	%	11	-2.0

Microbiological Testing			
Our Reference		391725-1	391725-2
Your Reference	UNITS	BH01	BH03
Date Sampled		26/09/2025	26/09/2025
Type of sample		Water	Water
Date of testing	-	27/09/2025	27/09/2025
Total Coliforms	MPN/100mL	<18	<18

Method ID	Methodology Summary
Ext-008	Subcontracted to Sonic Food & Water Testing. NATA Accreditation No. 4034.
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:- $\text{TDS} = \text{EC} \times 0.6$
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-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-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water 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/elements 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. Submission of low masses of sample e.g. for dust samples, may result in raised PQLs. Where molecular anion forms are calculated from an element (e.g. SO₄ from S or PO₄ from P stoichiometrically), the assumption is that the element is only present in that molecular anion form.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C ₆ -C ₁₀)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C₆-C₁₀)-BTX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

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 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	-			30/09/2025	2	30/09/2025	01/10/2025		30/09/2025	[NT]
Date Analysed	-			01/10/2025	2	01/10/2025	01/10/2025		01/10/2025	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	2	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	87	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	2	2	2	0	88	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	91	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	88	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	90	[NT]
Dibromomethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	90	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	89	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	91	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	2	<1	<1	0	92	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	2	<1	<1	0	93	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
Bromoform	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	95	[NT]
Styrene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	2	<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	2	<1	<1	0	95	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	2	101	100	1	100	[NT]
Surrogate Toluene-d8	%		Org-023	97	2	96	97	1	101	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	106	2	106	108	2	102	[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	-			30/09/2025	2	30/09/2025	01/10/2025		30/09/2025	[NT]
Date analysed	-			01/10/2025	2	01/10/2025	01/10/2025		01/10/2025	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	2	<10	<10	0	93	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	2	<10	<10	0	93	[NT]
Benzene	µg/L	1	Org-023	<1	2	<1	<1	0	90	[NT]
Toluene	µg/L	1	Org-023	<1	2	<1	<1	0	91	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
m+p-xylene	µg/L	2	Org-023	<2	2	<2	<2	0	95	[NT]
o-xylene	µg/L	1	Org-023	<1	2	<1	<1	0	95	[NT]
Naphthalene	µg/L	1	Org-023	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	2	101	100	1	100	[NT]
Surrogate Toluene-d8	%		Org-023	97	2	96	97	1	101	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	106	2	106	108	2	102	[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	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	86	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: PAHs in Water - Trace Level					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Naphthalene	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	76	[NT]
Acenaphthylene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	60	[NT]
Fluorene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	79	[NT]
Phenanthrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	83	[NT]
Anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	83	[NT]
Pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	85	[NT]
Benzo(a)anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	74	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	74	[NT]
Dibenzo(a,h)anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	86	[NT]	[NT]	[NT]	[NT]	88	[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	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
alpha-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	84	[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]	83	[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]	84	[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]	85	[NT]
Heptachlor Epoxide	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	90	[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]	81	[NT]
Dieldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Endrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	88	[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]	93	[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]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	91	[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	71	[NT]	[NT]	[NT]	[NT]	82	[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	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Dichlorvos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	109	[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]	86	[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]	102	[NT]
Chlorpyrifos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	94	[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]	97	[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]	101	[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	71	[NT]	[NT]	[NT]	[NT]	82	[NT]

Client Reference: 236315.00, Crows Nest

QUALITY CONTROL: PCBs in Water - Trace Level					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[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]	103	[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	69	[NT]	[NT]	[NT]	[NT]	70	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	105	[NT]

Client Reference: 236315.00, Crows Nest

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			29/09/2025	1	29/09/2025	29/09/2025		29/09/2025	[NT]
Date analysed	-			29/09/2025	1	29/09/2025	29/09/2025		29/09/2025	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		101	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	[NT]		99	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		102	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	130	[NT]		101	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	4	[NT]		104	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	108	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	17	[NT]		100	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	170	[NT]		99	[NT]

Client Reference: 236315.00, Crows Nest

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2025	1	29/09/2025	29/09/2025		29/09/2025	[NT]
Date analysed	-			29/09/2025	1	29/09/2025	29/09/2025		29/09/2025	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	1	1	[NT]		109	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	1	0.1	[NT]		102	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	1	4	[NT]		110	[NT]
Copper-Total	µg/L	1	Metals-022	<1	1	160	[NT]		105	[NT]
Lead-Total	µg/L	1	Metals-022	<1	1	4	[NT]		104	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	100	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	1	20	[NT]		105	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	1	170	[NT]		105	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	107	[NT]

Client Reference: 236315.00, Crows Nest

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2025	2	29/09/2025	29/09/2025		29/09/2025	[NT]
Date analysed	-			29/09/2025	2	29/09/2025	29/09/2025		29/09/2025	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	2	190	[NT]		99	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	2	880	1000	13	96	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	2	0.05	[NT]		100	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	2	<0.005	[NT]		99	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	2	0.01	[NT]		99	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	2	0.5	[NT]		81	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	2	0.5	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	2	0.5	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	2	0.01	[NT]		99	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	2	0.009	[NT]		110	[NT]

QUALITY CONTROL: PFAS in Water TRACE Short					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Date analysed	-			30/09/2025	[NT]	[NT]	[NT]	[NT]	30/09/2025	[NT]
Perfluorobutanesulfonic acid	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	93	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	96	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	97	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.0002	Org-029	<0.0002	[NT]	[NT]	[NT]	[NT]	110	[NT]
6:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	100	[NT]
8:2 FTS	µg/L	0.0004	Org-029	<0.0004	[NT]	[NT]	[NT]	[NT]	97	[NT]
Surrogate ¹³ C ₈ PFOS	%		Org-029	97	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate ¹³ C ₂ PFOA	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	106	[NT]
Extracted ISTD ¹³ C ₃ PFBS	%		Org-029	89	[NT]	[NT]	[NT]	[NT]	86	[NT]
Extracted ISTD ¹⁸ O ₂ PFHxS	%		Org-029	94	[NT]	[NT]	[NT]	[NT]	95	[NT]
Extracted ISTD ¹³ C ₄ PFOS	%		Org-029	92	[NT]	[NT]	[NT]	[NT]	89	[NT]
Extracted ISTD ¹³ C ₄ PFOA	%		Org-029	94	[NT]	[NT]	[NT]	[NT]	90	[NT]
Extracted ISTD ¹³ C ₂ 6:2FTS	%		Org-029	127	[NT]	[NT]	[NT]	[NT]	128	[NT]
Extracted ISTD ¹³ C ₂ 8:2FTS	%		Org-029	133	[NT]	[NT]	[NT]	[NT]	143	[NT]

QUALITY CONTROL: Ion Balance					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Date analysed	-			29/09/2025	[NT]	[NT]	[NT]	[NT]	29/09/2025	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	93	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	88	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	94	[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]	106	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

Report Comments

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).

Microbiological Testing - Microbiology analysed by Sonic Food & Water Testing. Report No. W2522122

The time between collection and the commencement of testing should not exceed 24 hours. Samples tested outside this time may have their results compromised

[illegible]

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Yeongbin Gim

Sample Login Details

Your reference	236315.00, Crows Nest
Envirolab Reference	391725
Date Sample Received	26/09/2025
Date Instructions Received	26/09/2025
Date Results Expected to be Reported	03/10/2025

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	2 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Date sampled on CoC written as 26/01/25, labelled on samples as 26/09/25. Assumed transcription error on CoC and followed sampling date on bottles.

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:



Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Trace Level	OCPs in Water - Trace Level	OP in water LL ANZECCF/ADWG	PCBs in Water - Trace Level	Total Phenolics in Water	HM in water - dissolved	HM in water - total	Metals in Waters - Acid extractable	Total Dissolved Solids (grav)	Total Suspended Solids	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	Total Nitrogen in water	TKN in water	Organic Nitrogen as N	NOx as N in water	Phosphate as P in water	PFAS in Water TRACE Short	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	Microbiological Testing
BH01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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.