GROUNDED
EXPERTISE

Specialist Advice
Groundwater Impact Assessment and Dewatering Management Plan

Proposed Residential Development

65 Muston Street, Mosman NSW

Prepared for Prosker Property Pty Ltd

Project 236982.02

12 February 2026

Douglas Partners Pty Ltd
ABN 75 053 980 117
douglaspartners.com.au
96 Hermitage Road, West Ryde, NSW 2114
(02) 9809 0666

GROUNDED EXPERTISE

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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.

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

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Table of Contents

Page No

Groundwater Impact Assessment and Dewatering Management Plan Proposed Residential Development 65 Muston Street, Mosman NSW

1. Introduction

1.1 Purpose of this report

This report prepared by Douglas Partners Pty Ltd (Douglas) outlines the groundwater impact assessment and dewatering management plan (DMP) for a proposed residential development, including in-fill affordable housing, at 65 Muston Street, Mosman. The work was undertaken in accordance with Douglas' proposal 236982.00.P.002.Rev0 dated 3 December 2025.

The project is a state-significant development (SSD-98068713). The purpose of this DMP is to accompany the submission of the environmental impact statement (EIS) for the project's approval. Additionally, this document aims to assist in obtaining the necessary approvals for the disposal of extracted groundwater, where applicable.

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

- Geotechnical investigation (Douglas, 2025a);
- Groundwater investigation summary (Douglas, 2025b); and
- Preliminary (contamination) site investigation (Douglas, 2025c).

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

- The proposed works will intercept the groundwater table;
- Groundwater levels on site have been observed at approximately RL 60.5 m to RL 65.6 m (Australian Height Datum, AHD);
- The proposed basement finished level will be at about RL 57.2 m;
- The basement is intended to be drained. The basement excavation will be supported by soldier pile walls or vertical cut in competent sandstone;
- The proposed method of dewatering is conventional sump and pump. It is assumed at this stage that the construction/dewatering of the basement will take about 1 year; and
- The extracted groundwater will be disposed of via stormwater.

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

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

1.2 Regulatory framework and guidance

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

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

  - **Secretary's Environmental Assessment Requirements**

Planning Secretary's Environmental Assessment Requirements (SEARs) were issued for the project's EIS on 12 November 2025. Those relevant to groundwater are presented in Table 1.

Table 1: Compliance table

Assessment Requirement	Report / Response
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.	Refer to geotechnical report (Douglas, 2025a)
• 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.	This report
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 demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	Refer to PSI report (Douglas, 2025c)

2. Site description

The site, 65 Muston Street, Mosman (known as SP32953), is situated on the eastern side of a north-south trending ridgeline. The site is an approximately rectangular shaped area of about 1342 m^2. The northern and southern boundaries are about 56 m long, and the eastern and western boundaries are about 24 m long.

The site is bounded to the north by a two and three storey rendered duplex building, to the south by a one and two storey rendered duplex building, to the east by Redan Lane and to the west by Muston Street. At their closest points, the buildings situated to the north and south of the site are both built to within about 1.5 m of the common boundaries.

The site is currently occupied by a two-storey brick and tile apartment building with a two-car garage on Muston Street (including a communal laundry underneath) and a two-car garage on Redan Lane.

3. Hydrogeological setting

3.1 Topography and hydrology

The site is located to the east of a ridgeline that peaks at the junction between Military Road and Spit Road at roughly RL 90 m). The topography surrounding the site slopes down to the east towards Balmoral Beach.

The survey plan indicates that the highest parts of the site, along Muston Street to the west, are at approximate RL 71.0 with the lowest parts of the site, along Redan Lane to the east, at RL 62.4 m. This gives a difference in level of about 8.6 m indicating an overall average site slope of about 9°.

Surface water from the site (originating from rainfall) is expected to run off site through the local stormwater system or percolate into the underlying soils. The closest waterbody is Hunters Bay at Balmoral Beach, which is approximately 600 m to the east.

The site's topographical setting is shown in Figure 1.

Figure 1: Aerial image of the site with 2 m AHD contours

3.2 Climate

The average annual rainfall in Mosman is about 1200 mm/year (www.bom.gov.au), in a temperate climate with warm summers, mild winters, and no dry seasons.

3.3 Geology

Reference to the Geological Survey of NSW Seamless Geology Map indicates that the site is underlain by Hawkesbury Sandstone. Hawkesbury Sandstone typically comprises medium to coarse grained sandstone, both massive and cross-bedded generally with two sets of steeply dipping joints striking NNE and ESE. The geotechnical investigation confirmed the published mapping.

3.4 Hydrogeology and groundwater source

Based on the hydrogeological setting, the site is assumed to underlain by the following groundwater systems:

- Minor fractured aquifers hosted by the underlying Hawkesbury Sandstone bedrock. This formation typically acts as a low-yield aquifer, although minor secondary permeability can occur where defects are present.

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

3.5 Groundwater receptors

A review of the Groundwater Dependent Ecosystems Atlas from the Australian Bureau of Meteorology indicates that there are no listed groundwater dependent ecosystems (GDE) within 500 m of the site.

A search of the publicly available registered groundwater bore database identified two registered groundwater bores within a 500 m radius of the site.

The two bores (GW108738 and GW106880) are recorded to be located approximately 315 m and 335 m away, respectively, to the south (cross-gradient) of the site and are registered for domestic purposes. GW108738 is recorded to extend to a depth of 84 m bgl with a standing water level (SWL) of 24 m; and GW106880 to a depth of 107.90 m bgl with a SWL of 37.8 m.

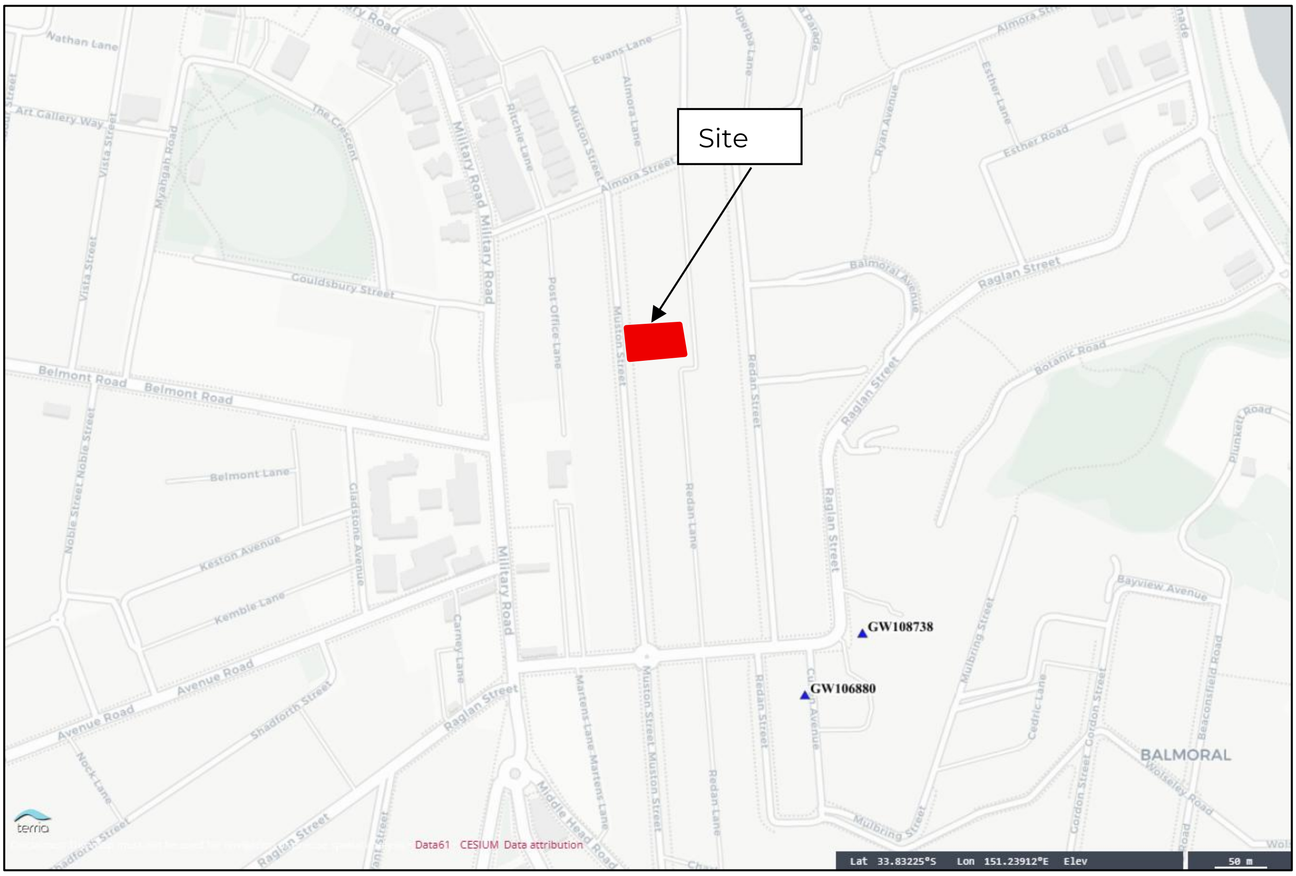

Figure 2: Groundwater receptors

3.6 Acid sulfate soils and salinity

Published acid sulfate soils (ASS) risk mapping from the NSW Department of Environment and Change indicates that the site is located within an area with extremely low probability of occurrence of acid sulphate soils.

As such, with consideration to the mapped geology and elevation of the site no further ASS assessment or management is considered necessary.

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

3.7 Contaminated sites

The following reports have been reviewed to assess contamination risk relevant to dewatering for the project:

- PSI (Douglas, 2025c).

The above report identified the following potential sources and contaminants of potential concern (CoPC) relevant to the proposed dewatering:

- On site sources of potential contamination included fill soils (associated with levelling the site) and current and former land use (potential use of pesticides) with associated relevant chemical CoPC comprised of heavy metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyls (PCB) and phenols; and
- The PSI included testing of one groundwater well for groundwater quality. It is noted that no significant contamination was identified in the soil or groundwater, although some exceedances of the site suitability criteria for metals (copper and zinc) and TRH fractions were reported. The groundwater results are discussed further in Section 4.2.3.

4. Investigation results

4.1 Geotechnical

A geotechnical investigation was undertaken by Douglas in 2025 (ref: 236982.00.R.001.Rev1 dated October 2025, Douglas 2025a). The investigation included the drilling of three cored boreholes (BH1 to BH3) to depths of between 8.92 m and 15.55 m. The test locations are shown in Drawing 1 (Appendix A).

The interpreted model can be summarised as follows:

- A surficial layer of sandy fill and clayey sand or sand (residual soil) to depths of between about 0.9 m and 1.0 m, possibly deeper in some areas and including large sandstone floaters; underlain by; and
- Sandstone bedrock inferred to possibly step down the site towards the east in a series of small (obscured) near vertical steps and ledges.

4.2 Groundwater

Three groundwater wells were installed within the site. Groundwater results are summarised in subsequent sections.

Table 2 summarises attributes of the monitoring wells. Their locations are shown on Drawing 1 (Appendix A).

Table 2: Monitoring well details

Well ID	Surface (m AHD)	Screen level (RL m AHD) [depth (m bgl)]	Screened lithology
BH1	69.4	61.4 - 53.85 [8.0 - 15.55]	Sandstone, slightly fractured
BH2	63.8	58.8 - 54.88 [5.0 - 8.92]	Sandstone, slightly fractured
BH3	68.8	60.8 - 53.25 [8.0 - 15.55]	Sandstone, slightly fractured

Notes: m bgl: metres below ground level

4.2.1 Groundwater levels

Free groundwater was not observed during augering of the boreholes and the use of drilling water in BH1 to BH3 prevented groundwater observations during coring.

Groundwater levels have been continuously recorded at hourly intervals since 12 August 2025 using data loggers installed in the monitoring wells. Hydrographs showing recorded levels in comparison with rainfall data over time are presented in Appendix C.

Maximum, minimum and average groundwater levels recorded by the dataloggers are presented in Table 3.

Table 3: Summary of logger data between 12 August 2025 and 13 November 2026

Well	Groundwater Elevation m AHD [mbgl]		
	Lowest	Highest	Average
BH1	65.3 [4.1]	65.6 [3.8]	65.4 [4.0]
BH2	60.5 [3.3]	60.9 [2.9]	60.7 [3.1]
BH3	64.8 [4.0]	64.9 [3.9]	64.8 [4.0]

Note mbgl – meters below ground level

4.2.2 Hydraulic conductivity

Rising head hydraulic conductivity tests were carried out at the monitoring wells on 12 and 13 August 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 4. The detailed results of the tests are attached in Appendix D.

Table 4: Interpreted hydraulic conductivity results

Well ID	Screen depth (m bgl)	Screened lithology	Hydraulic conductivity (m/s)
BH1	8.0 - 15.55	Sandstone, slightly fractured	9.9×10^{-8}
BH2	5.0 - 8.92	Sandstone, slightly fractured	8.7×10^{-8}
BH3	8.0 - 15.55	Sandstone, slightly fractured	3.7×10^{-7}
		Geometric mean	***1.5×10^{-7}***

4.2.3 **Groundwater quality**

Groundwater quality testing was undertaken as part of the PSI (Douglas, 2025c) from one of the monitoring well (BH2). The results provide an indication of baseline groundwater quality at the site and inform potential disposal options and management requirements (further discussed in Section 8.3).

Groundwater samples were collected and dispatched to a NATA accredited laboratory for the analysis of heavy metals, TRH, BTEX, PAH, OCP, OPP, PCB, phenols, physical parameters, miscellaneous inorganics, anions, cations, nutrients, faecal coliforms and thermotolerant coliforms, alkalinity.

For the purposes this DMP, the previous results have been assessed against the discharge criteria (refer to Section 8.4.1 and Appendix E). Note these criteria differ to those adopted in the PSI, 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 of 5.1, indicating slightly acidic conditions;
- Electrical conductivity (EC) values of 275.6 µS/cm, indicating fresh water;
- No non-aqueous phase liquids or oily sheens were recorded; and
- The following analytes were recorded above the discharge criteria:
  - Copper at 9 µg/L exceeded the (ANZG, 2018) marine default guideline value of 0.6 µg/L;
  - Zinc at 51 µg/L exceeded the DGV of 8 µg/L.

The recorded metals in groundwater are ubiquitous in urbanised areas of Sydney. The copper and zinc results are considered to be consistent with expected ambient ranges in groundwater.

There are no high reliability ANZG (2018) DGV for petroleum hydrocarbons, and as such laboratory practical quantitation limit ((PQL) have been adopted as an initial screen. The following TRH components were identified above the PQL:

- TRH F2 >C10-C16 less naphthalene record at 62 µg/L (primary sample) and 79 µg/L (duplicate sample); and
- TRH-F3 (C16-C34) recorded at 170 ug/L (primary sample) and 200 µg/L (duplicate sample).

No on-site source has been identified for the TRH, or is considered likely based on the site history, and as such further assessment of groundwater quality is recommended to assess the repeatability and significance of the detections.

Regarding other parameters as relevant to dewatering:

- Total suspended solids were lower than the total dissolved solids content. In part the detected metal concentrations (e.g., copper, zinc) could be associated with the solids content in the groundwater; and
- No faecal coliforms were detected in the groundwater.

Summary tables of analytical results and laboratory certificates are provided in Appendix E and Appendix F, respectively.

5. Conceptual hydrogeological model

The geotechnical investigation identified that the site is generally underlain by shallow sandy fill and residual soil, overlying sandstone bedrock. Groundwater levels were steady throughout the monitoring period, ranging between RL 60.5 m and RL 65.6 m, sloping east, which is consistent with the local surface topography. Groundwater also likely exists near the soil-rock interface, particularly after rainfall.

It is expected that groundwater occurs via rainfall infiltration on the site and surrounds, including water flowing downslope laterally through the natural soils and bedrock from areas of higher topography.

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

6. Groundwater inflow and drawdown assessment

6.1 Methodology

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

A 2-dimensional (2D) numerical groundwater model was developed. The modelling was carried out using the finite element hydrogeological software SEEP/W (a component of GeoStudio) developed by GEOSLOPE International Ltd.

6.1.1 Model geometry and layer

A cross section in the west to east direction intercepting the basement footprint was selected to run the 2D analysis. For inflow modelling purposes, the excavation geometry was simplified to a rectangular area, approximately 50 m in length (including the 40 m basement and staircase) and 24 m in width. The basement was modelled along the 50 m length in the 2D cross section.

The hydrogeological units were simplified and simulated as one layer. Adopted hydraulic properties (base case) are presented in Table 5. Parameters were selected based on the results of the hydraulic conductivity testing (Section 4.2.2), ranges of values documented in the available literature for similar lithologies (e.g. Fetter 1994 and Hoek & Bray 1981) and previous experience with similar materials.

Table 5: Model layers and adopted hydraulic properties (base case)

Layer	Material	Saturated Kh (m/s)	Anisotropy Ratio (Kv/Kh)	Effective Porosity (%)	Material Model Adopted
1	Sandstone	1.5×10^{-7}	0.2	15	Unsaturated / saturated

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

6.1.2 Model calibration – Initial Heads

A net infiltration percentage of 2% of the average annual rainfall (Section 3.2) was assigned as water influx over the ground surface, due to the sites urban setting.

The model adopted an upstream constant head boundary at RL 76.5 m on the western edge and a downstream constant head boundary at RL 36 m on the southern edge to replicate the average groundwater levels observed within the site, as shown on Figure 3. The model boundary was extended 150 m from the northern and southern excavation boundaries

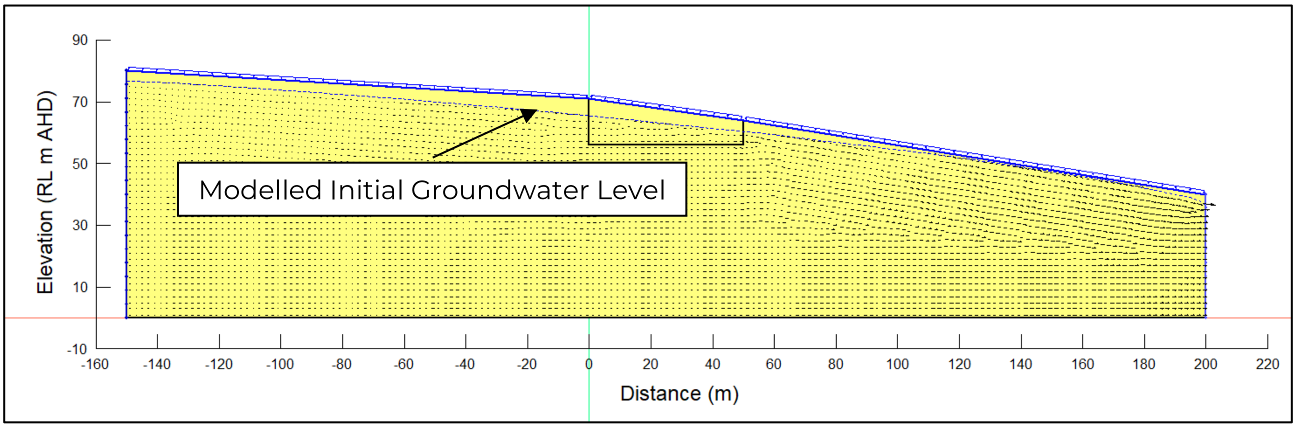

Figure 3: Model cross section, showing calibrated groundwater level

6.1.3 Basement design and dewatering

The basement walls and sub-floor drainage were simulated as 'Seepage Faces' in SEEP/W with zero hydraulic pressure head along the full perimeter. The proposed finished floor level for the basement is understood to be 57.2 m . A dewatering level of RL 56.2 m was used throughout the modelled basement area), to allow for the construction of a concrete slab and pad footings.

6.1.4 Simulation

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

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

6.2 Sensitivity scenarios

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

- Sensitivity 1: assuming the sandstone has a hydraulic conductivity five times as conductive than base case conditions (i.e. 7.5×10^{-7} m/s).
- Sensitivity 2: assuming the water table is 2 m higher than under base case conditions.
- Sensitivity 3: assuming the anisotropy ratio of the permeability of the sandstone is 1.0 (five times as the base case condition).

6.3 Groundwater modelling results

6.3.1 Predicted groundwater inflow

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

The SEEP/W results are based on a two-dimensional model, which assumes the excavation is much longer than its width (i.e.. the plane-strain condition). In order to convert these predictions to more realistic values, the following expression proposed by Kavvadas et al (1992) was used to adjust the analytical results to allow for the actual length to width ratio of the proposed basement.

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

where: qo is the predicted 'realistic' inflow rate

q is the inflow rate from 2D modelling

B is the width of the modelled excavation (in-plane of the 2D model)

L is the length of the modelled excavation (out-of-plane of the 2D model)

Given that the long side of the basement (50 m) was modelled as the in-plane of the 2D model, i.e. B>L, a reduction factor of 0.7 was conservatively adopted. The average inflow rates predicted from the model have been reduced using this reduction factor to account for the basement shape.

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

- Table 6, for the base case scenarios as detailed in previous sections; and
- Table 7, for the sensitivity analysis.

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

Table 6: Base case - predictive Model of Simulated Groundwater Inflow Rates with time

Elapsed Time	Dewatering Inflow Rate		
	Inflow rate (L / min)	Volume (m^3 / day)	Cumulative Inflow (ML)
3	10.98	15.81	
7	4.11	5.92	
14	3.80	5.47	
30	3.64	5.24	
60	3.51	5.05	
90	3.32	4.78	
180	3.17	4.56	
365	2.88	4.15	1.58
Post-construction	1.38	1.99	0.72 ML/year

Table 7: Sensitivity cases - Simulated long term groundwater inflow

Elapsed Time	Sensitivity 1 – high k		Sensitivity 2 – high GWL		Sensitivity 3 – high kv/kh	
	m^3 / day	ML/year	m^3 / day	ML/year	m^3 / day	ML/year
Post-construction	10.50	3.83	2.51	0.92	3.00	1.10

Notes: k: hydraulic conductivity
GWL: groundwater level

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

- Inflow increases will be significant if higher permeability sandstone is intersected by the excavation; and,
- Inflow increases will be minor in the event of heavy rain and elevated groundwater levels.

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.

6.3.2 Predicted groundwater drawdown and settlement

The simulated lowered groundwater levels, or impact to the water table, outside the basement footprint over the long term are shown in Figure 4 and summarised in Table 8. The model results indicate a maximum drawdown close to the excavation of about 7.2 m, reducing to 2.0 m at a distance of 100 m from the excavation. As the groundwater drawdown is expected to occur within the Hawkesbury Sandstone, settlements on adjacent structures due to dewatering are expected to be negligible.

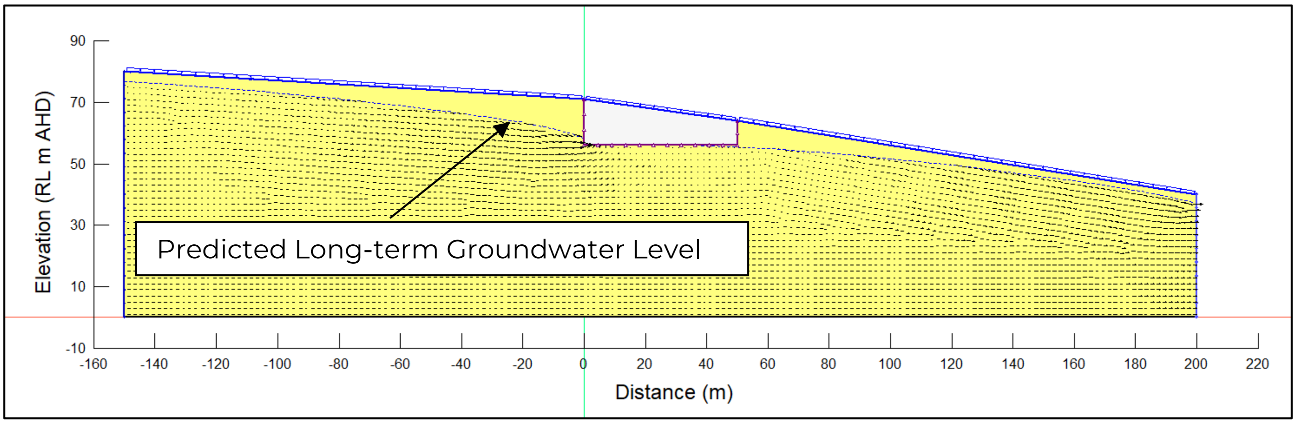

Figure 4: Predicted long term groundwater level (base case)

Table 8: Predictive model simulated drawdown

	Distance from Excavation				
	0 m	10 m	20 m	40 m	100 m
Drawdown Depth (m) Upstream	7.2	5.4	4.7	3.2	1.0
Drawdown Depth (m) Downstream	5.5	5.1	4.6	4.0	2.0

7. Impact assessment

7.1 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.

7.2 Risk assessment

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

Therefore, the predicted impacts of dewatering are less than the Level 1 minimal impact considerations with reference to the NSW AIP.

Table 9: Assessment of Potential Effects of Dewatering

Item	Comment
Impacts on potential GDEs	There are no listed groundwater dependent ecosystems within 500 m of the site.
Water supply losses by neighbouring groundwater users	The nearest registered bores are over 300 m away from the site. groundwater drawdown is predicted to be less than 2.0 m from 100 m away from the site.
Potential subsidence of neighbouring structures	Groundwater drawdown is predicted to occur within the sandstone. Therefore, risk of settlements 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 (Section 3.7) and baseline water quality data (Section 4.2.3) has been undertaken. Based on this review and the project details it is considered that:

Item	Comment
	• The available data indicates that dewatering will potentially extract groundwater with contaminants (ie, copper and zinc) which exceed the discharge criteria and TRH F2(>C10-C16 less naphthalene) and TRH-Fr(C16-C34) which exceeded the PQL (refer to section 8.4.1) • The available data does not indicate a potential for the dewatering to mobilise a known off-site contamination plume. Controls to mitigate potential contamination impacts are provided in Section 8.

8. Recommended management strategy

8.1 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.

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.

8.2 Groundwater inflow control

8.2.1 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 8.5.

8.2.2 Trigger levels

Control measures will be monitored against two key thresholds:

- Volume trigger: inflow exceeds 3.0 ML/year (limit for an ongoing Water Access Licence exemption); or
- Drawdown trigger: groundwater drawdown exceeds 7.5 m at any monitoring well.

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

8.3 Discharge options and contingency measures

Management options for groundwater disposal are presented in Table 10.

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

Table 10: Summary of possible management options

Management Option	Comments
Option 1: On-site treatment and disposal to stormwater.	Generally applicable where the treatment required is routine, e.g., solids removal, alum dosing and pH adjustment. Treatment of specific contaminants may require more physical space and result in higher treatment costs. Water disposed to stormwater is typically required to meet general NSW DPE requirements (NSW DPE 2021 & 2022), ANZG (2018) water quality standards for the relevant receiving water body and any associated uses. Further requirements may be enforced depending on the specific approval documentation.
Option 2: * Disposal to the sewer under a Trade Waste Agreement with Sydney Water.	Generally, will require further negotiation and establishment of water quality criteria prior to disposal. Water quality screening levels will depend on the specific trade waste agreement with Sydney Water.
Option 3: ** Tanker off-site for disposal at a licensed 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.

8.4 Water quality control

As outlined in Section 8.3, the preferred disposal option is discharge to the 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 4.2.3 and Table 8, it is likely that some form of treatment of groundwater will be required prior to discharge.

8.4.1 Discharge criteria

The discharge criteria, and rationale for the criteria are provided in Table 11 below and in Appendix E. The adopted discharge criteria are based on the stormwater system discharging to a marine water 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 marine 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.

Table 11: Summary of screening criteria (units given in µg/L unless otherwise stated)

Analyte		Marine water DGV (95% LOP)	Recreational water guideline values	Physical Parameters
Metals	Arsenic (III / V)	-	100	-
	Cadmium	5.5	20	-
	Chromium (III / VI)	4.4	500	-
	Copper	0.6	20000	-
	Mercury (inorganic)	0.1	10	-
	Lead	4.4	100	-
	Nickel	70	200	-
	Zinc	8	30000 (aesthetic only)	-
	Manganese	-	5000	-
BTEX	Benzene	700	10	-

Analyte		Marine water DGV (95% LOP)	Recreational water guideline values	Physical Parameters
	Ethylbenzene	80	3000	-
	m-Xylene	75	6000 (total xylene)	-
	o-xylene	-	6000 (total xylene)	-
	p-Xylene	-	6000 (total xylene)	
	Toluene	180	8000	
PAH	Anthracene	0.4	-	-
	Benzo(a)pyrene	0.2	0.1	-
	Fluoranthene	1.4	-	-
	Naphthalene	70	-	-
	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	400	-	-
	Pentachlorophenol	22	100	-
	2,4,6-Trichlorophenol	-	200	-
OCP	Aldrin	0.003	3 (Aldrin + Dieldrin)	-
	Chlordane	0.001	20	-
	DDT	0.0004	90	-
	Dieldrin	-	3 (Aldrin + Dieldrin)	-
	Endosulfan	0.01	200	-
	Endrin	0.008	-	-
	Heptachlor	0.0004	3	-
	Lindane	0.007		
	Methoxychlor	0.004	3000	-
	Toxaphene	0.0006		

<table>
<tr><th colspan="2">Analyte</th><th>Marine water DGV
(95% LOP)</th><th>Recreational water guideline values</th><th>Physical Parameters</th></tr>
<tr><td rowspan="7">OPP</td><td>Chlorpyrifos</td><td>0.009</td><td>100</td><td>-</td></tr>
<tr><td>Diazinon</td><td>-</td><td>40</td><td>-</td></tr>
<tr><td>Dimethoate</td><td>-</td><td>70</td><td>-</td></tr>
<tr><td>Fenitrothion</td><td><u>0.001</u></td><td>70</td><td>-</td></tr>
<tr><td>Malathion</td><td>-</td><td>700</td><td>-</td></tr>
<tr><td>Parathion</td><td>-</td><td>200</td><td>-</td></tr>
<tr><td>Temephos</td><td>0.05</td><td></td><td></td></tr>
<tr><td>Nutrients - Dissolved</td><td>Ammonia as N</td><td>910</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">Oil and Grease</td><td>5000 (< PQL)[a]</td><td>5000 (< PQL)[a]</td><td>Nonvisible</td></tr>
<tr><td colspan="2">Faecal Coliforms</td><td>100 (<PQL)[a]</td><td>100 (<PQL)[a]</td><td>-</td></tr>
<tr><td rowspan="5">Physical Parameters</td><td>Conductivity</td><td>-</td><td>-</td><td>125 - 2200 µs/cm [b]</td></tr>
<tr><td>pH</td><td>-</td><td>6.5-8.5 aesthetic only)</td><td>6-8 [b]
(6.5-8.5) [c]</td></tr>
<tr><td>Dissolved Oxygen</td><td>-</td><td>>80% saturation (aesthetic only)</td><td>85-120 % saturation [b]</td></tr>
<tr><td>Turbidity</td><td>-</td><td>-</td><td>6-50 NTU [b]</td></tr>
<tr><td>Total Suspended Solids</td><td>-</td><td>-</td><td>< 50 mg/L [d]</td></tr>
</table>

Notes: PQL – laboratory practical quantification limit

Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection

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 µs/cm

c – range of typical neutral pH conditions.

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

8.4.2 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.

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

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

The requirements for each phase are provided below.

8.4.3.1 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 previous groundwater data as reported in Section 4.2.3 is sufficient to inform the baseline water quality for the project with the exception of metals and TRH.

Accordingly, an additional round of groundwater sampling is recommended from all three groundwater wells for analysis of metals, TRH, BTEX and silica gel clean of TPH. The results will be used to further inform treatment requirements. 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.

8.4.3.2 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 of to stormwater following confirmation it meets the discharge criteria, subject to Council approval. For a continuous treatment approach the treated water cannot be disposed of to stormwater until the treatment trial has been successfully completed. The treated groundwater may be stored on site, or 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 8.4.3.4. 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 8.4.3.4 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.

8.4.3.3 **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 (e.g., filters nearing end of life).

The base requirements for routine monitoring are provided in Section 8.5. The sampling frequency and analytical suite should be reviewed by the Environmental Consultant during the dewatering period. Based on this review the Environmental Consultant may recommend:

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

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

8.4.3.4 **Analytes**

The testing suite shown in Table 12 below has been adopted based on the following information:

- The requirements of DPE (2022a);
- The contaminants of potential concern identified in the previous investigations (refer to Section 3.7).
- The baseline water quality data (refer to Section 4.2.3);
- The potential for spills / leaks during excavation works; and
- General parameters to inform suitability of the water for discharge and changes in groundwater source.

Table 12: Proposed suite of analytes for water quality monitoring

Category	Analytes	Minimum frequency
Field parameters	pH, visible / olfactory signs of turbidity, oil / grease, chemical / noxious odours	Baseline [1] Treatment trial [1] Daily during discharge
	EC, REDOX potential (Eh), temperature, dissolved oxygen	Baseline [1] Treatment trial [1] Monthly [1]
Physical parameters	Alkalinity (total, carbonate, hydroxide bicarbonate), TDS, total hardness, TSS, total organic carbon (TOC), sodium absorption ratio (SAR)	Baseline [1] Treatment trial [1] Monthly [1]
Major ions	Sulfate (SO4), chloride (Cl), carbonates (CO3), bromide (Br), fluoride (F), Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K) Cation/anion balance (as a percentage)	Treatment trial [1] Monthly [1]
Metals (total and dissolved)	Arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe) lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn)	Baseline [1] Treatment trial [2] Every routine sampling event [2]
Organics	TRH / TPH, BTEX, Naphthalene	Baseline [1] Treatment trial [2] Every routine sampling event [2]

Notes:

1. Based on requirements of DPE (2022a)
2. Based on available data. Sampling requirements and frequencies may be reviewed as discussed in Section 8.4.3.3

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

8.5 Monitoring and reporting requirements

The following monitoring program and associated reporting shown in Table 13 below is to be adopted until the end of excavation and construction works on-site. Groundwater level monitoring should be continued one month after construction. Groundwater level monitoring should be undertaken in a minimum of three monitoring wells. It is recommended that the existing monitoring wells used for the groundwater investigation be used during and after construction. Any wells damaged during construction should be replaced in a timely manner.

Table 13: Monitoring and reporting requirements

Item	Monitoring requirements	Methodology
Visual inspection	No visible oil and grease, sheen, significant discolouration or odours.	Daily inspections during discharge (by contractor). **HOLD POINT -** If indicators are observed, discharge must be suspended pending analytical confirmation.
Field parameter assessment	pH, daily, preferably continuously Visible / olfactory signs of turbidity, oil / grease, chemical / noxious odours: daily	• Prior to discharge or during discharge: Daily observations (by contractor).
Groundwater level monitoring	Monitor of drawdown in the vicinity of the site is considered not necessary. The groundwater level in the vicinity of the site is expected to be around the bulk excavation level for a drained basement, subject to review and approval by DCCEEW.	Not required.
Water quality sampling and testing	Samples from treated water to assess compliance with discharge criteria (Appendix E). As per analytical requirements in Section 8.4.3.4. Samples from untreated water as required to inform treatment requirements	All monitoring: • Sampling by suitably experienced environmental engineer / scientist. • Field parameters (pH, EC, turbidity) using field probes. • Chain of Custody (COC) documentation to accompany all samples. • Analysis by a NATA-accredited laboratory. Baseline and treatment trial: • As per Section 8.4.3. Routine: • Fortnightly; • Review and update frequency in accordance with Section 8.4.3.4. **HOLD POINT -** If water exceeds assessment criteria (SAC), manage as per contingency strategy (Section 8.7).
Quality control sampling	Replicate sampling to verify lab result accuracy.	• Conducted during above sampling events.

Item	Monitoring requirements	Methodology
		• Analyse at a rate of 10% of samples. • Testing suite: Metals, TRH, BTEX and naphthalene. • Results to be included in final dewatering completion report.
Quantity of groundwater inflows	Measurements of groundwater volumes (as per Section 8.2).	• Weekly monitoring and reporting of groundwater abstraction volumes. • Results to be included in final dewatering completion report. **HOLD POINT -** If volumes exceed trigger levels or Council discharge allowance, works must be halted to minimise inflow (e.g., via grouting).
Dewatering completion report	Final documentation of the dewatering program.	Prepared by a suitably qualified consultant and to include: • Summary of contractor records (e.g. visual inspections, unexpected finds) • Full analytical and quality control results. • Records of dewatering volumes. Commentary on compliance and any non-conformances with the DMP.

8.6 Personnel and responsibilities

Table 14 below outlines the proposed project personnel and relevant responsibilities as part of the management plan.

Table 14: 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.

8.7 Contingency plan

As per Section 8.5, at any hold point if any non-conformance is encountered then the following general contingency plan will be enacted:

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

9. 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.

9.1 Water Access Licence (WAL) and entitlements

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

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

Groundwater modelling undertaken for the project predicts that groundwater inflow rates will be low (0.72 ML/year estimated under baseline conditions). Sensitivity analyses assuming a higher rock permeability (five times the baseline value) indicate inflow rates marginally exceeding 3 ML/year. Based on our experience with sandstone permeability in the local area and across Sydney more broadly, the likelihood of site-wide sandstone permeability being as high as 7.5×10^{-7} m/s is considered low.

Given that the long-term predicted inflow is generally less than 3 ML/year, the proposed drained basement may be eligible for an ongoing Water Access Licence exemption. However, this will be subject to review and approval by Department of Climate Change, Energy, the Environment and Water (DCCEEW).

9.2 Water Supply Works Approval (WSWA)

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

9.3 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 8.4.1.
- Discharge to sewer: A trade waste agreement may be required from the relevant water utility – refer to Section 8.3.
- Discharge off-site: A licensed contractor must be engaged, and records of transport and disposal must be maintained – refer to Section 8.3.
- Environmental Protection Licence (EPL): May be required if discharge volumes or quality trigger thresholds under the Protection of the Environment Operations Act 1997.

10. Conclusion

The geotechnical investigation identified that the site is generally underlain by shallow sandy fill and residual soil, overlying sandstone bedrock. The bedrock has low hydraulic conductivity. Groundwater levels were steady throughout the monitoring period, ranging between RL 60.5 m and RL 65.6 m, sloping east.

The basement is proposed to be drained. Based on the provided architectural drawings, the finished floor level of the proposed basement will be at about RL 57.2 m. Therefore, the water table will be intersected during the basement excavation.

Under baseline conditions, groundwater modelling predicts that the total groundwater inflow during the first year of construction could be up to 1.58 ML, and then progressively reduce to about 0.72 ML/year in the long term (post construction). Results of the sensitivity analyses suggest inflows could be up to 3.62 ML/year in the long term.

The modelling suggests that dewatering inflows would be relatively low and manageable with sumps and pumps. A drained basement is therefore considered technically feasible.

The project is not expected to impact any GDEs or groundwater supply works with reference to the AIP minimal impact considerations.

Groundwater quality testing results suggested that some background metal concentrations exceed the adopted discharge criteria for disposal to stormwater, as discussed in Section 4. Note that the adopted discharge criteria should be confirmed in agreement with the relevant consent authority (for stormwater disposal). Some treatment for metals and potentially TRH and BTEX will be required. Should discharge criteria be exceeded for other analytes, treatment may be required for those other contaminants prior to disposal.

The monitoring and management measures outlined in this DMP are to be implemented to control inflows and groundwater quality throughout the construction of the project, including:

- Regular monitoring of groundwater inflows and water levels to confirm that actual conditions are consistent with model predictions;
- Water quality testing and treatment to verify compliance with proposed discharge criteria prior to discharge to the stormwater system;
- Inflow and water quality recording throughout construction dewatering, and preparation of a dewatering completion report at the end of construction; and
- Adaptive management measures, including inflow controls (e.g. grouting), if inflows, drawdown or water quality differ materially from predicted conditions.

Based on the modelling results, the long-term predicted inflow is generally less than 3 ML/year, the proposed drained basement may be eligible for an ongoing Water Access Licence exemption. However, this will be subjected to review and approval by DCCEEW.

It should be noted that modelling predictions are estimates based on the information available. Actual groundwater inflows and drawdown may vary from those calculated.

11. References

ANZECC. (2000). *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* .

ANZG. (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra, ACT: Australian and New Zealand Governments and Australian state and territory governments.

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Douglas. (2025b). *Groundwater Investigation Summary, 65 Muston Street, Mosman NSW.* (Reference: 236982.00.R.002.Rev0).

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HEPA. (2025). *PFAS National Environmental Management Plan (NEMP).* Version 3.0: Heads of EPAs Australia and New Zealand.

NHMRC. (2008). *Guidelines for Managing Risks In Recreational Water.*

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NSW DPE. (2022b). *Groundwater assessment toolbox for Major Projects in NSW - Overview document.*

NSW DPE. (2022c). *Guidelines for Groundwater Documentation for SSD/SSI Projects.*

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NSW DPE. (2022e). *Cumulative Groundwater Impact Assessment Approaches.*

NSW DPI. (2012). *NSW Aquifer Interference Policy.*

Sundaram, B. e. (2009). *Groundwater Sampling and Analysis - A Field Guide.* Geoscience Australia, Record 2009/27 95 pp.

WaterNSW. (n.d.). *Construction Dewatering, Information for councils and applicants, Fact Sheet.*

WaterNSW. (n.d.). *General Terms of Approval, Construction Dewatering, Dact Sheet.*

NSW DPI. (2013). *Aquifer Interference Policy: NSW Policy for Managing the Impacts of Groundwater Extraction.*

12. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 65 Muston Street, Mosman NSW in line with Douglas' proposal dated 3 December 2025. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of Prosker Property Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another 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.

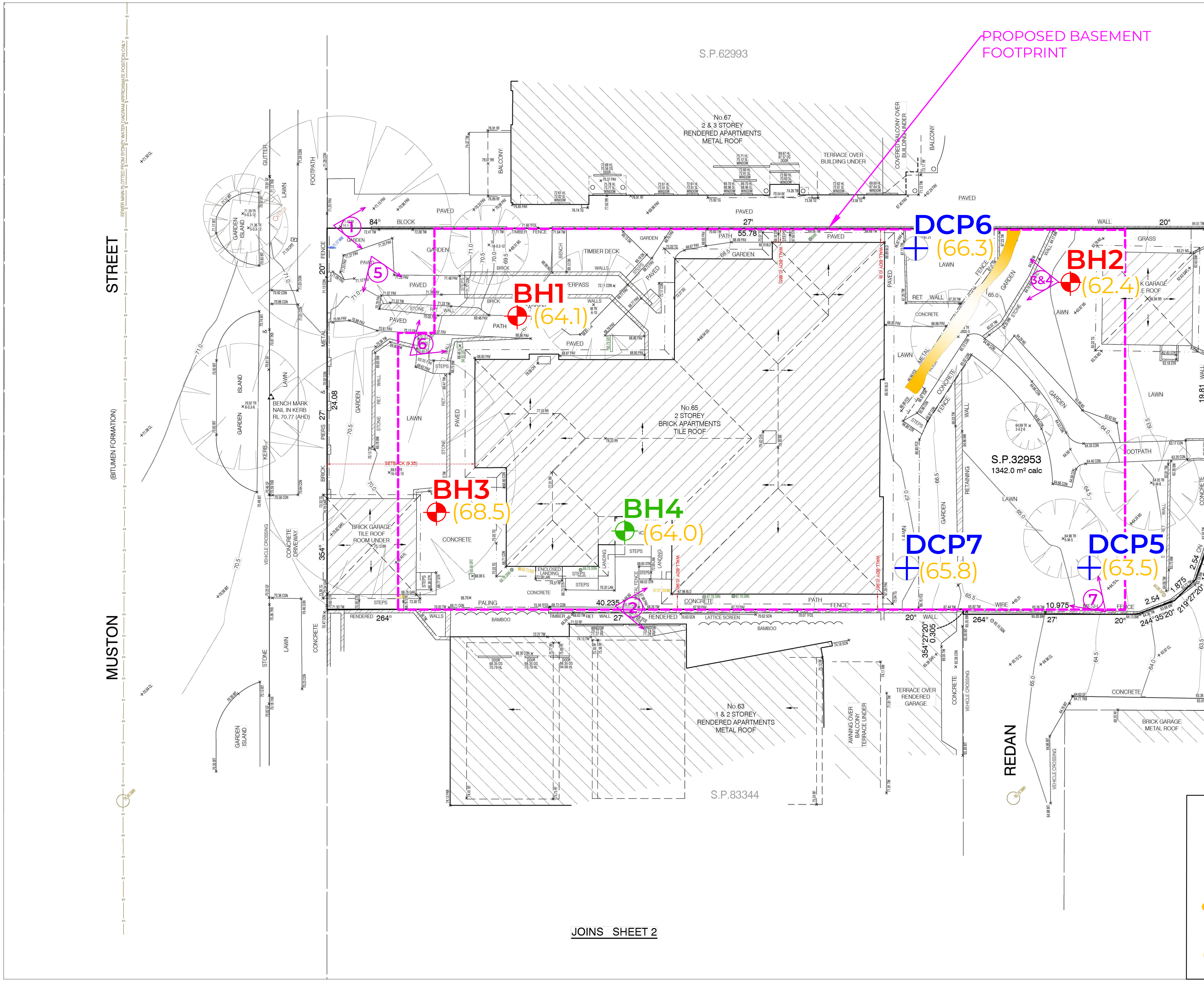
The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical, environmental and groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided,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

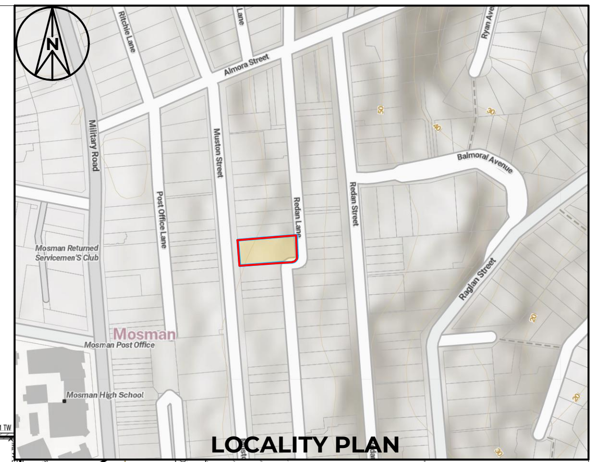
This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation,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

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

Appendix A

Drawings





LEGEND

- Cored Borehole and Groundwater Well
- Hand-Augered Borehole and Dynamic Cone Penetrometer(DCP) Test
- Dynamic Cone Penetrometer Test
- Sandstone Outcrop
- Photo number with direction of view
- (65.0) RL Top of rock (Approximate)

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Initial Issue	19.08.2025	MN

SCALE: 0 1 2 3 4 5 6 7 8 9 10
1:250 @ A3

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

CLIENT: **Prosker Property Pty Ltd**

NOTE:
1: Base Survey Plan from CMS Surveyors pty ltd, Drawing Name 24328Bdetail, Issue 2 (Dated 24.07.2025)

PROJECT NAME: **Proposed Residential Development**

PROJECT ADDRESS: **65 Muston Street, Mosman**

DRAWING TITLE: **Test Location Plan**

PROJECT No: **236982.00**

DRAWING No: **1**

REVISION: **0**

Appendix B

About this Report

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.

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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.

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

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

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

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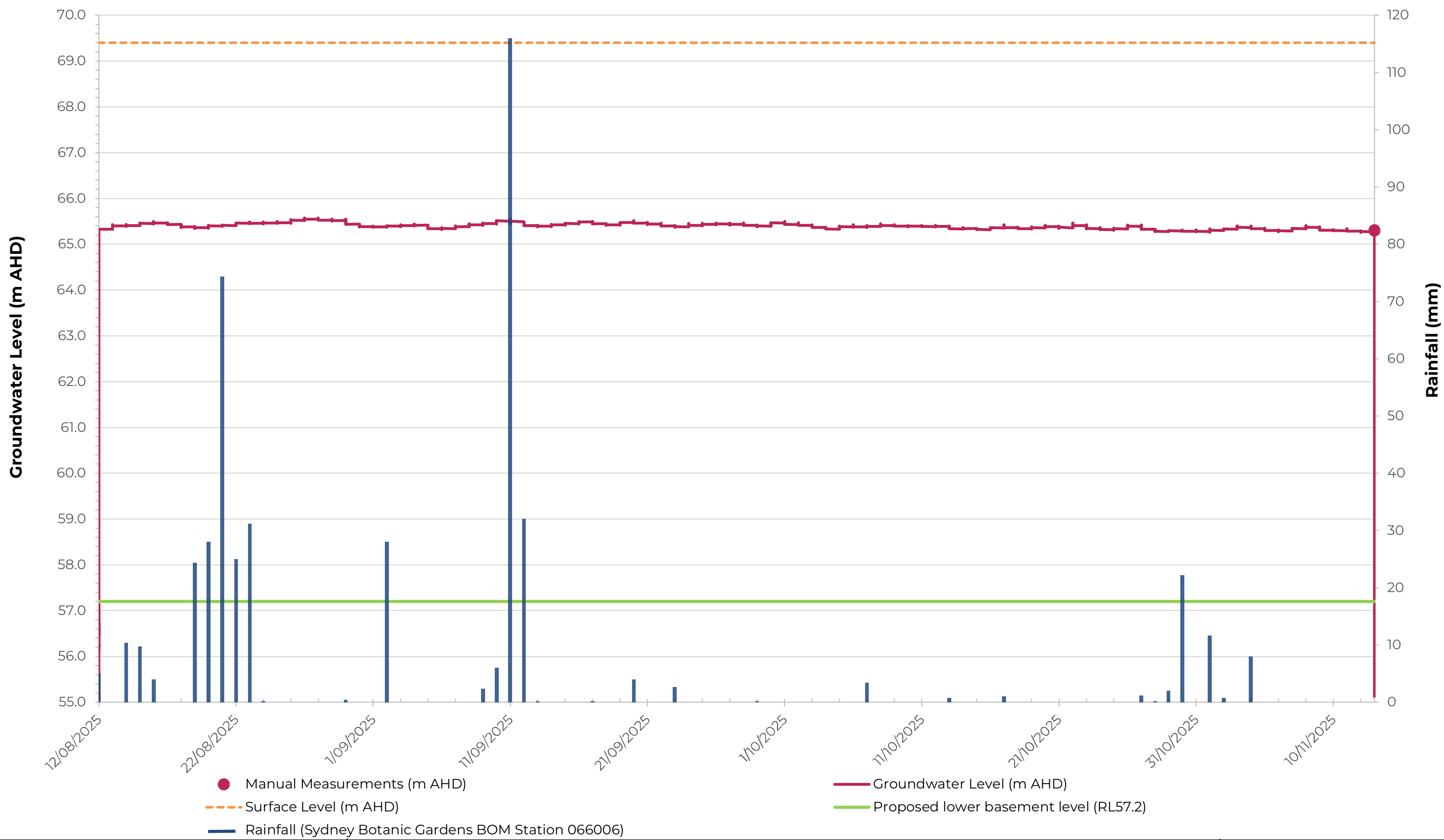
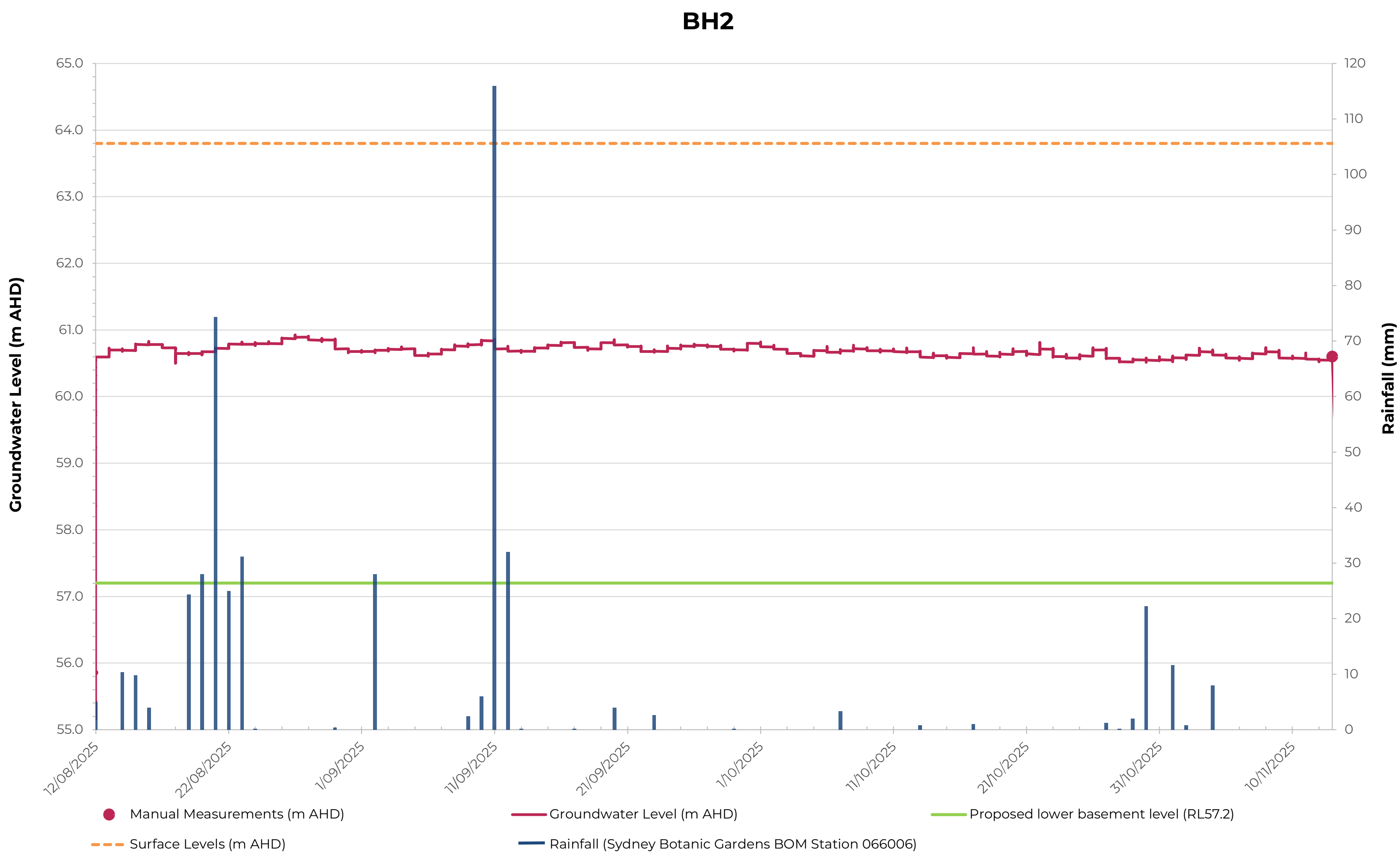
Appendix C

Hydrographs

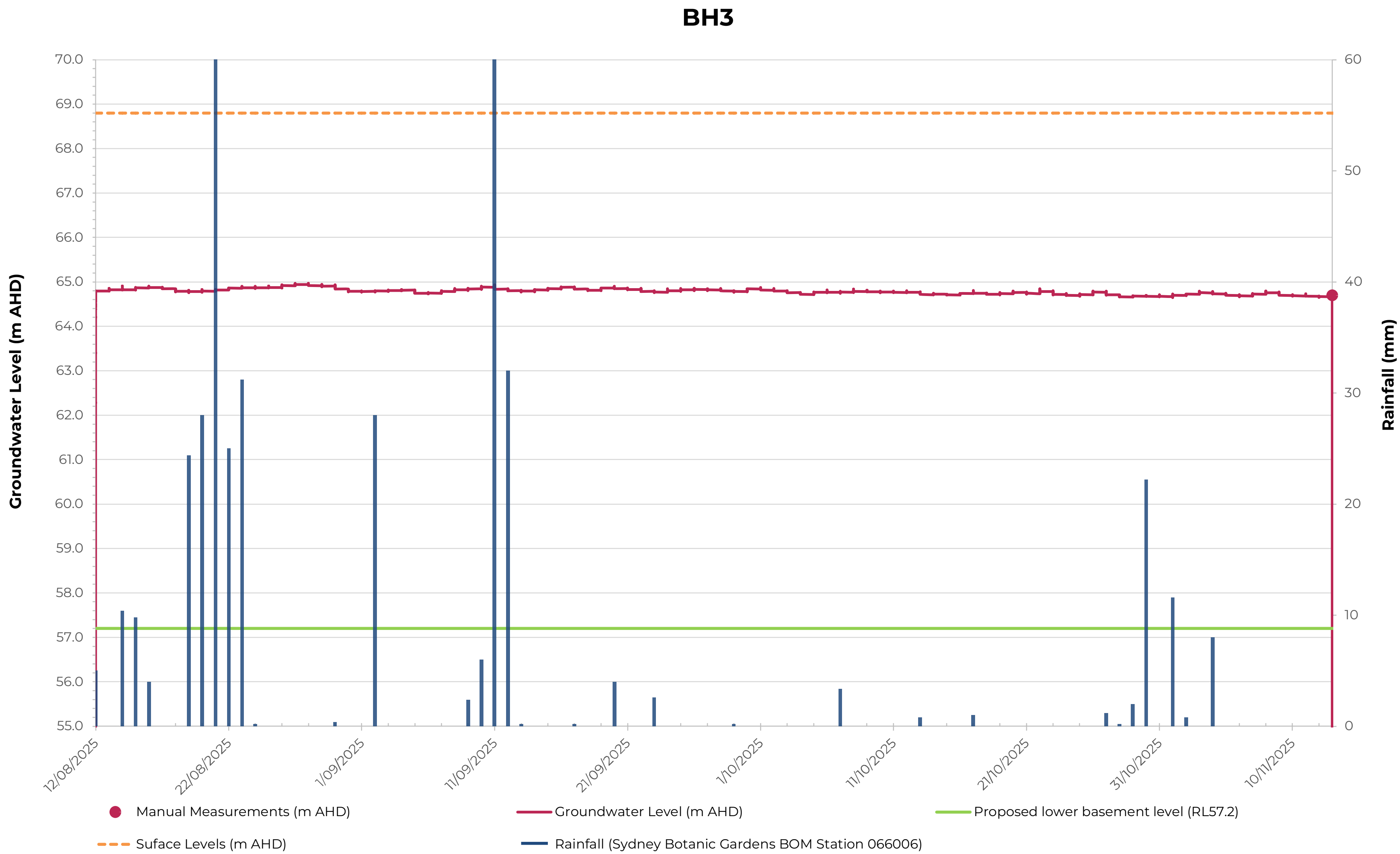
BH1



Douglas PARTNERS	CLIENT: Prosker Pty Ltd		**Groundwater Monitoring 18/08/25 to 13/11/25**	PROJECT NO: 236982.00
	OFFICE: Sydney	DRAWN BY: D. Keeling	**Proposed Residential Development**	FIGURE NO: 1 of 3
	SURFACE LEVEL: 69.4 m AHD	DATE: 14 November 2025	**65 Muston Road, Mosman, NSW**	REVISION: Rev0



Douglas PARTNERS	CLIENT: Prosker Pty Ltd		Groundwater Monitoring 18/08/25 to 13/11/25	PROJECT NO: 236982.00
	OFFICE: Sydney	DRAWN BY: D. Keeling	**Proposed Residential Development**	FIGURE NO: 2 of 3
	SURFACE LEVEL: 63.8 m AHD	DATE: 14 November 2025	**65 Muston Road, Mosman, NSW**	REVISION: Rev0



Douglas PARTNERS	CLIENT: Prosker Pty Ltd		**Groundwater Monitoring 18/08/25 to 13/11/25**	PROJECT NO: 236982.00
	OFFICE: Sydney	DRAWN BY: D. Keeling	**Proposed Residential Development**	FIGURE NO: 3 of 3
	SURFACE LEVEL: 68.8 m AHD	DATE: 14 November 2025	**65 Muston Road, Mosman, NSW**	REVISION: Rev0

Appendix D

Hydraulic testing results

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

Permeability Testing - Rising Head Test Report

Client:	Prosker Property Pty Ltd	Project No:	236982.00
Project:	Proposed Residential Development	Test date:	12-Aug-25
Location:	65 Muston Road, Mosman	Tested by:	DK

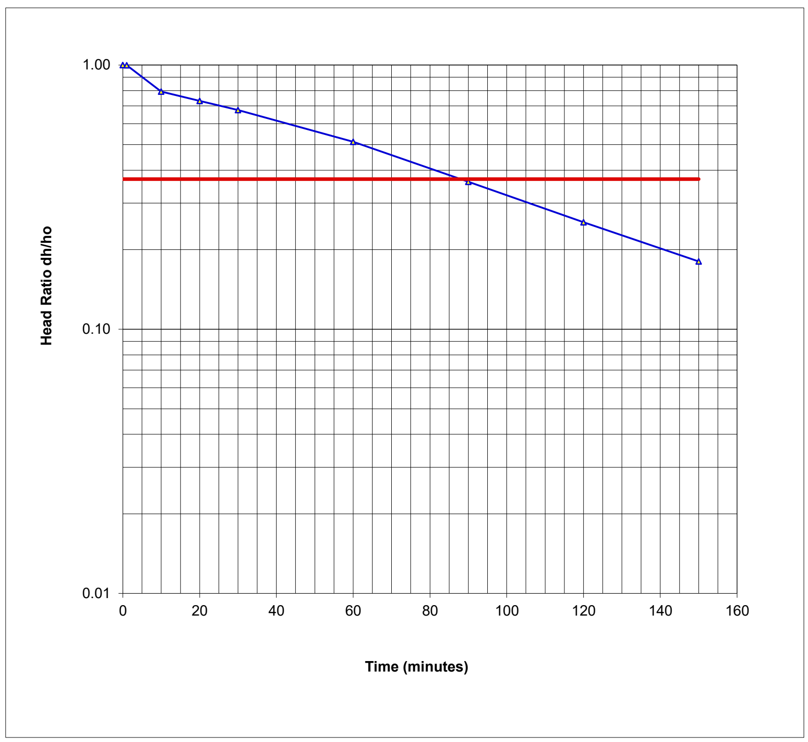
Test Location	BH1	**Test No.**	1	
Description:	Standpipe in borehole	Easting:	337654.0	m
Material type:	Sandstone	Northing	6255506.0	m
		Surface Level:	69.4	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.1	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	14.33	m
Effective well screen length (Le)	7.55	m	Depth to top of gravel pack	8.00	m
			Depth of base of PVC standpipe	15.55	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	14.33	10.23	1.000
1.0	14.31	10.21	0.998
10	12.22	8.12	0.793
20	11.58	7.48	0.731
30	11.02	6.92	0.676
60	9.34	5.24	0.512
90	7.80	3.70	0.362
120	6.70	2.60	0.254
150	5.95	1.85	0.181



To = 85 minutes
5100 seconds

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity k = **9.9E-08** m/sec
= **0.009** m/day

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

Permeability Testing - Rising Head Test Report

Client:	Prosker Property Pty Ltd	Project No:	236982.00
Project:	Proposed Residential Development	Test date:	12-Aug-25
Location:	65 Muston Road, Mosman	Tested by:	DK

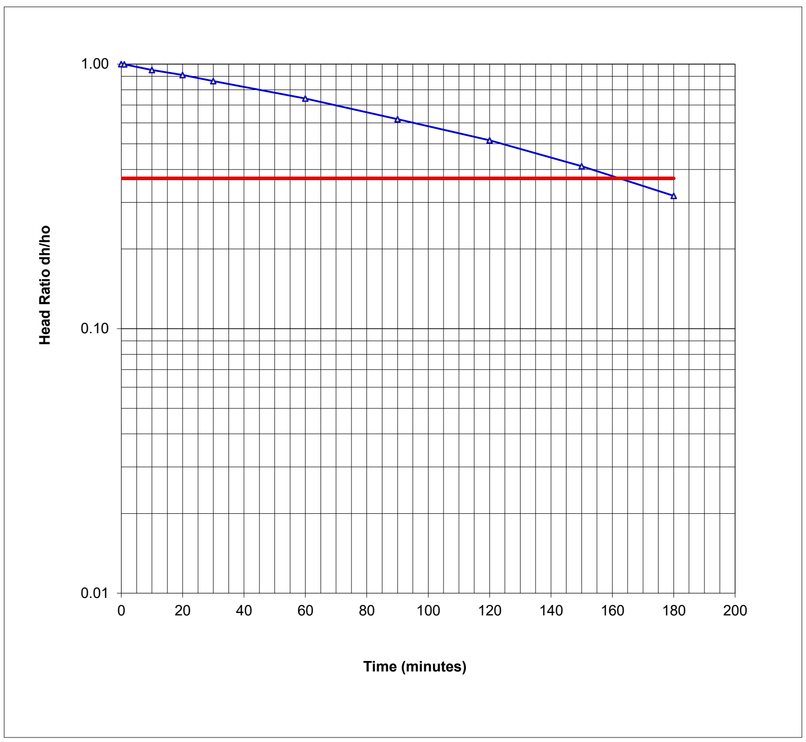
Test Location	BH2	**Test No.**	1	
Description:	Standpipe in borehole	Easting:	337686.3	m
Material type:	Sandstone	Northing	6255510.0	m
		Surface Level:	63.8	m AHD

Details of Well Installation

Effective diameter (2re)	76 mm		Depth to water before test	3.2	m
Borehole diameter (2R)	76 mm		Depth to water at start of test	8.55	m
Effective well screen length (Le)	3.90 m		Depth to top of gravel pack	5.00	m
			Depth of base of PVC standpipe	8.90	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	8.56	5.36	1.000
1.0	8.54	5.34	0.998
10	8.29	5.09	0.951
20	8.07	4.87	0.910
30	7.82	4.62	0.863
60	7.17	3.97	0.742
90	6.51	3.31	0.619
120	5.96	2.76	0.515
150	5.40	2.20	0.411
180	4.90	1.70	0.318



To = 165 minutes
9900 seconds

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity **k = 8.7E-08** m/sec
= 0.007 m/day

Permeability Testing - Rising Head Test Report

Client:	Prosker Property Pty Ltd	Project No:	236982.00
Project:	Proposed Residential Development	Test date:	12-Aug-25
Location:	65 Muston Road, Mosman	Tested by:	DK

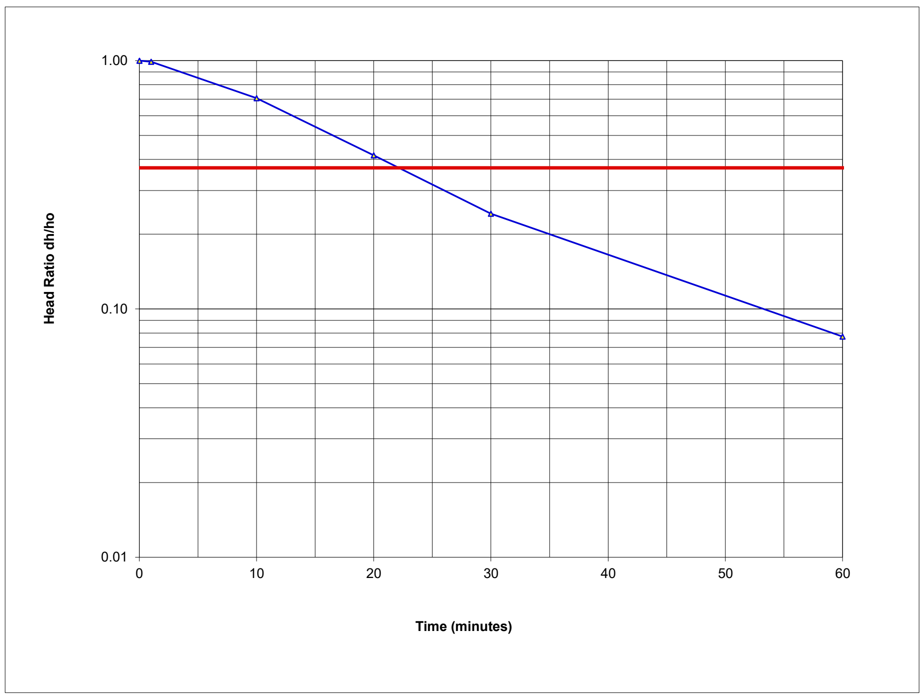
Test Location	BH3	**Test No.**	1	
Description:	Standpipe in borehole	Easting:	337649.1	m
Material type:	Sandstone	Northing	6255494.0	m
		Surface Level:	68.8	m AHD

Details of Well Installation

Effective diameter (2re)	76	mm	Depth to water before test	4.1	m
Borehole diameter (2R)	76	mm	Depth to water at start of test	14.44	m
Effective well screen length (Le)	7.55	m	Depth to top of gravel pack	8.00	m
			Depth of base of PVC standpipe	15.55	m

Test Results

Time (min)	Depth (m)	Change in Head dH (m)	dH/Ho
0.0	14.44	10.34	1.000
1.0	14.34	10.24	0.990
10	11.40	7.30	0.706
20	8.40	4.30	0.416
30	6.60	2.50	0.242
60	4.90	0.80	0.077
90	4.50	0.40	0.039
120	4.30	0.20	0.019
150	4.20	0.10	0.010



To = 23 minutes
1380 seconds

Theory: Falling Head Permeability calculated using equation by Hvorslev

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

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

Hydraulic Conductivity	**k =**	**3.7E-07**	m/sec
	=	**0.032**	m/day

Appendix E

Water quality summary table

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Table E2: Summary of Laboratory Results – Groundwater assessment

				ANZG (2018) 95% LOP	NHMRC (2012) Recreation		
Sample ID						BH2	BD20250818
Sample Date		PQL	Units			18/08/25	18/08/25
Metals - Dissolved	Total Arsenic	1	µg/L	13	100	**11**	**11**
	Cadmium	0.1	µg/L	5.5	20	**0.4**	**0.4**
	Total Chromium	1	µg/L	4.4	500	**2**	**2**
	Copper	1	µg/L	0.6	20,000	**9**	**6**
	Lead	1	µg/L	4.4	50	<1	<1
	Mercury (inorganic)	0.05	µg/L	0.1	10	<0.05	<0.05
	Nickel	1	µg/L	70	200	**7**	**6**
	Zinc	1	µg/L	8	3000 (aesthetic)	**51**	**47**
TRH	F1 ((C6-C10)-BTEX)	10	µg/L	PQL		<10	<10
	F2 (>C10-C16 less Naphthalene)	50	µg/L	PQL		**62**	**79**
	F3 (>C16-C34)	100	µg/L	PQL		**170**	**200**
	F4 (>C34-C40)	100	µg/L	PQL		<100	<100
BTEX	Benzene	1	µg/L	700	10	<1	<1
	Toluene	1	µg/L	180	8,000	<1	<1
	Ethylbenzene	1	µg/L	80	3,000	<1	<1
	o-Xylene	1	µg/L			<1	<1
	m+p-Xylene	2	µg/L	75		<2	<2
	Total Xylenes	1	µg/L		6,000	<1	<1
PAH	Acenaphthene	0.1	µg/L			<0.1	<0.1
	Acenaphthylene	0.1	µg/L			<0.1	<0.1
	Anthracene	0.1	µg/L	0.4		<0.1	<0.1
	Benzo(a)anthracene	0.1	µg/L			<0.1	<0.1
	Naphthalene	1	µg/L	70		<1	<1
	Benzo(a)pyrene (B(a)P)	0.1	µg/L	0.2	0.1	<0.1	<0.1
	Benzo(b,j+k)fluoranthene	0.2	µg/L			<0.2	<0.2
	Benzo(g,h,i)perylene	0.1	µg/L			<0.1	<0.1
	Chrysene	0.1	µg/L			<0.1	<0.1
	Dibenzo(a,h)anthracene	0.1	µg/L			<0.1	<0.1
	Fluoranthene	0.1	µg/L	1.4		<0.1	<0.1
	Fluorene	0.1	µg/L			<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	µg/L			<0.1	<0.1
	Phenanthrene	0.1	µg/L	2		<0.1	<0.1
	Pyrene	0.1	µg/L			<0.1	<0.1
	Sum of detected PAH	0.1	µg/L			<0.1	<0.1
OCP	DDE	0.01	µg/L			<0.01	-
	DDT	0.006	µg/L	<u>0.0004</u>	90	<0.006	-
	DDD	0.01	µg/L			<0.01	-
	Aldrin	0.01	µg/L	<u>0.003</u>		<0.01	-
	Dieldrin	0.01	µg/L			<0.01	-
	Aldrin + Dieldrin (calculated)	0.01	µg/L		3	<0.01	-
	alpha-chlordane	0.01	µg/L		20	<0.01	-
	gamma-Chlordane	0.01	µg/L		20	<0.01	-
	Endosulfan I	0.02	µg/L		200	<0.02	-
	Endosulfan II	0.02	µg/L		200	<0.02	-
	Endosulfan Sulphate	0.02	µg/L		200	<0.02	-
	Endrin	0.01	µg/L	0.008		<0.01	-
	Heptachlor	0.01	µg/L	<u>0.0004</u>	3	<0.01	-
	Heptachlor Epoxide	0.01	µg/L			<0.01	-
	Hexachlorobenzene	0.01	µg/L	0.1		<0.01	-
	Methoxychlor	0.02	µg/L	<u>0.004</u>	3000	<0.02	-
	Mirex	0.02	µg/L			<0.02	-
	alpha-BHC	0.05	µg/L			<0.05	-
	beta-BHC	0.05	µg/L			<0.05	-
	delta-BHC	0.05	µg/L			<0.05	-
	Lindane	0.05	µg/L	<u>0.007</u>	100	<0.05	-
	Sum of detected OCP	0.006	µg/L			<0.006	-
OPP	Azinphos methyl (Guthion)	0.02	µg/L		300	<0.02	-
	Bromophos-ethyl	0.05	µg/L		100	<0.05	-
	Chlorpyriphos	0.009	µg/L	0.009	100	<0.009	-
	Chlorpyriphos-methyl	0.05	µg/L			<0.05	-
	Diazinon	0.01	µg/L		40	<0.01	-
	Dichlorvos	0.05	µg/L		50	<0.05	-
	Dimethoate	0.1	µg/L		70	<0.1	-
	Ethion	0.05	µg/L		40	<0.05	-
	Ronnel (fenchlorphos)	0.05	µg/L			<0.05	-
	Fenitrothion	0.05	µg/L	<u>0.001</u>	70	<0.05	-
	Fenthion	0.05	µg/L		70	<0.05	-

Table E2: Summary of Laboratory Results – Groundwater assessment

Sample ID				ANZG (2018) 95% LOP	NHMRC (2012) Recreation	BH2	BD20250818
Sample Date		PQL	Units			18/08/25	18/08/25
	Malathion	0.05	µg/L		700	<0.05	-
	Parathion	0.004	µg/L		200	<0.004	-
	Parathion-methyl	0.05	µg/L		7	<0.05	-
	Methidathion	0.05	µg/L		60	<0.05	-
	Fenamiphos	0.05	µg/L		5	<0.05	-
	Sum of detected OPP	0.004	µg/L			<0.004	-
PCB	Arochlor 1016	0.1	µg/L			<0.1	-
	Arochlor 1221	0.1	µg/L			<0.1	-
	Arochlor 1232	0.1	µg/L			<0.1	-
	Arochlor 1242	0.1	µg/L			<0.1	-
	Arochlor 1248	0.1	µg/L			<0.1	-
	Arochlor 1254	0.1	µg/L			<0.1	-
	Aroclor 1260	0.1	µg/L			<0.1	-
	Sum of detected PCB	0.1	µg/L			<0.1	-
Nutrients	Nitrogen	100	µg/L			**300**	-
	Ammonia as N	5	µg/L	910		**5**	-
	TKN in water	100	µg/L			**300**	-
	Nitrate as N	5	µg/L	2600	500,000	**8**	-
	Nitrite as N	5	µg/L		30,000	<5	-
	NOx as N	5	µg/L			**10**	-
	Organic Nitrogen as N	200	µg/L			**300**	-
	Phosphorous	50	µg/L			<50	-
Miscellaneous inorganics	Total dissolved solids	5,000	µg/L			**140,000**	-
	Total suspended solids	5,000	µg/L			**16,000**	-
	Total organic carbon	1,000	µg/L			**5,000**	
	pH	-	pH			**6**	
	Electrical conductivity	1	µS/cm			**3,000**	
Coliforms	Faecal coliforms	1	cfu/100ml			<1	
Anions & Cations	Bicarbonate Alkalinity as CaCO3	5	mg/L			**18**	-
	Chloride	1	mg/L			**37**	-
	Hydroxide Alkalinity (OH-) as CaCO3	5	mg/L			<5	-
	Ionic Balance	-	%			**-1**	-
	Sulphate	1	mg/L			**35**	-
	Total Alkalinity as CaCO3	5	mg/L			**18**	-
Anions & Cations - Dissolved	Calcium	0.5	mg/L			**8**	-
	Magnesium	0.5	mg/L			**3**	-
	Potassium	0.5	mg/L			**1**	-
	Sodium	0.5	mg/L			**31**	-

Notes:

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

Douglas PARTNERS

Table QA2: Trip Blank Results - Water Sampling

Sample ID		TB
Sample Date		18/08/25
Media Being Sampled		Water
Sample Type		Water
Units		µg/L
TRH	F1 ((C6-C10)-BT	<10
BTEX	Benzene	<1
	Toluene	<1
	Ethylbenzene	<1
	o-Xylene	<1
	m+p-Xylene	<2
	Total Xylenes	<1
PAH	Naphthalene	<1
	Sum of detect	<1
Lab Report No		388786

Table QA3: Trip Spike Results – Water Sampling (% Recovery)

Sample ID	TS
Sample Date	18/08/25
dia Being Samp	Water
Sample Type	Water
Benzene	120
Toluene	119
Ethylbenzene	120
o-Xylene	120
m+p-Xylene	117
Lab Report No	388786

Table QA1: Relative Percentage Difference Results – Water Sampling

Lab Report No		388786	388786		
Sample ID		BH2	BD20250818		
Sample Date		18/08/25	18/08/25	Difference	RPD
Sample Type		Water	Water		
Units		µg/L	µg/L	µg/L	%
Metals - Dissol	Total Arsenic	**11**	**11**	0	0%
	Cadmium	**0.4**	**0.4**	0	0%
	Total Chromiu	**2**	**2**	0	0%
	Copper	**9**	**6**	3	**40%**
	Lead	<1	<1	0	0%
	Mercury (inorg	<0.05	<0.05	0	0%
	Nickel	**7**	**6**	1	15%
	Zinc	**51**	**47**	4	8%
TRH	F1 ((C6-C10)-BT	<10	<10	0	0%
	F2 (>C10-C16 l	**62**	**79**	17	24%
	F3 (>C16-C34)	**170**	**200**	30	16%
	F4 (>C34-C40)	<100	<100	0	0%
BTEX	Benzene	<1	<1	0	0%
	Toluene	<1	<1	0	0%
	Ethylbenzene	<1	<1	0	0%
	o-Xylene	<1	<1	0	0%
	m+p-Xylene	<2	<2	0	0%
	Total Xylenes	<1	<1	0	0%
PAH	Acenaphthene	<0.1	<0.1	0	0%
	Acenaphthyle	<0.1	<0.1	0	0%
	Anthracene	<0.1	<0.1	0	0%
	Benzo(a)anthr	<0.1	<0.1	0	0%
	Naphthalene	<1	<1	0	0%
	Benzo(a)pyrer	<0.1	<0.1	0	0%
	Benzo(b,j+k)flu	<0.2	<0.2	0	0%
	Benzo(g,h,i)pe	<0.1	<0.1	0	0%
	Chrysene	<0.1	<0.1	0	0%
	Dibenzo(a,h)ar	<0.1	<0.1	0	0%
	Fluoranthene	<0.1	<0.1	0	0%
	Fluorene	<0.1	<0.1	0	0%
	Indeno(1,2,3-c,c	<0.1	<0.1	0	0%
	Phenanthrene	<0.1	<0.1	0	0%
	Pyrene	<0.1	<0.1	0	0%
	Sum of detect	<0.1	<0.1	0	0%

Appendix F

Water quality laboratory reports

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

CERTIFICATE OF ANALYSIS 388786

Client Details

Client	Douglas Partners Pty Ltd
Attention	Lisa Teng
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**236982.01, Mosman, Muston**
Number of Samples	4 Water
Date samples received	19/08/2025
Date completed instructions received	19/08/2025

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	26/08/2025
Date of Issue	25/08/2025

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Jack Wallis, Senior Chemist
Loren Bardwell, Development Chemist
Nancy Zhang, Laboratory Manager, Sydney
Priya Samarawickrama, Senior Chemist
Tabitha Roberts, Senior Chemist
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water					
Our Reference		388786-1	388786-2	388786-3	388786-4
Your Reference	UNITS	BH2	BD20250818	TS	TB
Date Sampled		18/08/2025	18/08/2025	18/08/2025	18/08/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	19/08/2025	19/08/2025	19/08/2025	19/08/2025
Date analysed	-	20/08/2025	20/08/2025	20/08/2025	20/08/2025
TRH C_6 - C_9	µg/L	<10	<10	[NA]	<10
TRH C_6 - C_{10}	µg/L	<10	<10	[NA]	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	[NA]	<10
Benzene	µg/L	<1	<1	120%	<1
Toluene	µg/L	<1	<1	119%	<1
Ethylbenzene	µg/L	<1	<1	120%	<1
m+p-xylene	µg/L	<2	<2	117%	<2
o-xylene	µg/L	<1	<1	120%	<1
Naphthalene	µg/L	<1	<1	[NA]	<1
Surrogate Dibromofluoromethane	%	99	99	103	99
Surrogate Toluene-d8	%	98	98	103	98
Surrogate 4-Bromofluorobenzene	%	103	103	102	102

svTRH (C10-C40) in Water			
Our Reference		388786-1	388786-2
Your Reference	UNITS	BH2	BD20250818
Date Sampled		18/08/2025	18/08/2025
Type of sample		Water	Water
Date extracted	-	20/08/2025	20/08/2025
Date analysed	-	20/08/2025	20/08/2025
TRH C_{10} - C_{14}	µg/L	<50	60
TRH C_{15} - C_{28}	µg/L	150	160
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	150	220
TRH >C_{10} - C_{16}	µg/L	62	79
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	62	79
TRH >C_{16} - C_{34}	µg/L	170	200
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	230	280
Surrogate o-Terphenyl	%	96	96

PAHs in Water			
Our Reference		388786-1	388786-2
Your Reference	UNITS	BH2	BD20250818
Date Sampled		18/08/2025	18/08/2025
Type of sample		Water	Water
Date extracted	-	20/08/2025	20/08/2025
Date analysed	-	21/08/2025	21/08/2025
Naphthalene	µg/L	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	75	87

OCPs in Water - Low Level		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date extracted	-	20/08/2025
Date analysed	-	21/08/2025
alpha-BHC	µg/L	<0.05
HCB	µg/L	<0.01
beta-BHC	µg/L	<0.05
gamma-BHC	µg/L	<0.05
Heptachlor	µg/L	<0.01
delta-BHC	µg/L	<0.05
Aldrin	µg/L	<0.01
Heptachlor Epoxide	µg/L	<0.01
gamma-Chlordane	µg/L	<0.01
alpha-Chlordane	µg/L	<0.01
Endosulfan I	µg/L	<0.02
pp-DDE	µg/L	<0.01
Dieldrin	µg/L	<0.01
Endrin	µg/L	<0.01
Endosulfan II	µg/L	<0.02
pp-DDD	µg/L	<0.01
pp-DDT	µg/L	<0.006
Endosulfan Sulphate	µg/L	<0.02
Methoxychlor	µg/L	<0.02
Mirex	µg/L	<0.02
Surrogate 4-Chloro-3-NBTF	%	67

OP in water LL ANZECCF/ADWG		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date extracted	-	20/08/2025
Date analysed	-	21/08/2025
Dichlorvos	µg/L	<0.05
Mevinphos	µg/L	<0.05
Phorate	µg/L	<0.05
Dimethoate	µg/L	<0.1
Diazinon	µg/L	<0.01
Disulfoton	µg/L	<0.05
Chlorpyriphos-methyl	µg/L	<0.05
Parathion-Methyl	µg/L	<0.05
Ronnel	µg/L	<0.05
Fenitrothion	µg/L	<0.05
Malathion	µg/L	<0.05
Chlorpyriphos	µg/L	<0.009
Fenthion	µg/L	<0.05
Parathion	µg/L	<0.004
Bromophos ethyl	µg/L	<0.05
Methidathion	µg/L	<0.05
Fenamiphos	µg/L	<0.05
Ethion	µg/L	<0.05
Phosalone	µg/L	<0.05
Azinphos-methyl (Guthion)	µg/L	<0.02
Coumaphos	µg/L	<0.05
Surrogate 4-Chloro-3-NBTF	%	67

PCBs in Water - Low Level		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date extracted	-	20/08/2025
Date analysed	-	21/08/2025
Aroclor 1016	µg/L	<0.1
Aroclor 1221	µg/L	<0.1
Aroclor 1232	µg/L	<0.1
Aroclor 1242	µg/L	<0.1
Aroclor 1248	µg/L	<0.1
Aroclor 1254	µg/L	<0.1
Aroclor 1260	µg/L	<0.1
Surrogate 2-Fluorobiphenyl	%	66

Total Phenolics in Water		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date extracted	-	21/08/2025
Date analysed	-	21/08/2025
Total Phenolics (as Phenol)	mg/L	<0.05

HM in water - dissolved			
Our Reference		388786-1	388786-2
Your Reference	UNITS	BH2	BD20250818
Date Sampled		18/08/2025	18/08/2025
Type of sample		Water	Water
Date prepared	-	20/08/2025	20/08/2025
Date analysed	-	20/08/2025	20/08/2025
Arsenic-Dissolved	µg/L	11	11
Cadmium-Dissolved	µg/L	0.4	0.4
Chromium-Dissolved	µg/L	2	2
Copper-Dissolved	µg/L	9	6
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	7	6
Zinc-Dissolved	µg/L	51	47

Ion Balance		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date prepared	-	19/08/2025
Date analysed	-	19/08/2025
Calcium - Dissolved	mg/L	8.0
Potassium - Dissolved	mg/L	1
Sodium - Dissolved	mg/L	31
Magnesium - Dissolved	mg/L	3
Hardness (calc) equivalent $CaCO_3$	mg/L	34
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	18
Carbonate Alkalinity as $CaCO_3$	mg/L	<5
Total Alkalinity as $CaCO_3$	mg/L	18
Sulphate, SO4	mg/L	35
Chloride, Cl	mg/L	37
Ionic Balance	%	-1.0

Miscellaneous Inorganics		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date prepared	-	19/08/2025
Date analysed	-	19/08/2025
pH	pH Units	6.0
Electrical Conductivity	µS/cm	300
Total Suspended Solids	mg/L	16
Total Dissolved Solids (grav)	mg/L	140
Total Organic Carbon	mg/L	5
Ammonia as N in water	mg/L	0.005
Nitrate as N in water	mg/L	0.008
Nitrite as N in water	mg/L	<0.005
NOx as N in water	mg/L	0.01
Total Nitrogen in water	mg/L	0.3
Phosphate as P in water	mg/L	<0.005
TKN in water	mg/L	0.3
Organic Nitrogen as N	mg/L	0.3

Metals in Waters - Acid extractable		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date prepared	-	20/08/2025
Date analysed	-	21/08/2025
Phosphorus - Total	mg/L	<0.05

Microbiological Testing		
Our Reference		388786-1
Your Reference	UNITS	BH2
Date Sampled		18/08/2025
Type of sample		Water
Date of testing	-	20/08/2025
Faecal Coliforms	cfu/100mL	<1

Method ID	Methodology Summary
Ext-008	Subcontracted to Sonic Food & Water Testing. NATA Accreditation No. 4034.
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-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-079	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
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 stochiometrically from Phosphorus (assumed to be present as Phosphate). Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation. Submission of low masses of sample e.g. for dust samples, may result in raised PQLs. Where molecular anion forms are calculated from an element (e.g. SO4 from S or PO4 from P stoichiometrically), the assumption is that the element is only present in that molecular anion form.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			19/08/2025	1	19/08/2025	20/08/2025		19/08/2025	[NT]
Date analysed	-			20/08/2025	1	20/08/2025	21/08/2025		20/08/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	80	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	80	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	77	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	79	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	80	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	81	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	81	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	98	1	99	99	0	97	[NT]
Surrogate Toluene-d8	%		Org-023	98	1	98	98	0	101	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	103	1	103	104	1	100	[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	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
Date analysed	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	90	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	96	[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]	90	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	96	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	77	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
Date analysed	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	78	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	67	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	63	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	76	[NT]	[NT]	[NT]	[NT]	81	[NT]

QUALITY CONTROL: OCPs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
Date analysed	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
alpha-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	84	[NT]
HCB	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	83	[NT]
gamma-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	113	[NT]
delta-BHC	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	86	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	101	[NT]
gamma-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	80	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	90	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	87	[NT]
Endosulfan II	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	61	[NT]
pp-DDT	µg/L	0.006	Org-022	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	88	[NT]
Methoxychlor	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mirex	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	61	[NT]	[NT]	[NT]	[NT]	63	[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	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
Date analysed	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
Dichlorvos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	94	[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]
Chlorpyriphos-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]	82	[NT]
Fenitrothion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	71	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	86	[NT]
Chlorpyriphos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	88	[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]	62	[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]	84	[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	61	[NT]	[NT]	[NT]	[NT]	63	[NT]

QUALITY CONTROL: PCBs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			20/08/2025	[NT]	[NT]	[NT]	[NT]	20/08/2025	[NT]
Date analysed	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
Aroclor 1016	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Aroclor 1260	µg/L	0.1	Org-021/022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	64	[NT]	[NT]	[NT]	[NT]	63	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
Date analysed	-			21/08/2025	[NT]	[NT]	[NT]	[NT]	21/08/2025	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: HM in water - dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	388786-2
Date prepared	-			20/08/2025	1	20/08/2025	20/08/2025		20/08/2025	20/08/2025
Date analysed	-			20/08/2025	1	20/08/2025	20/08/2025		20/08/2025	20/08/2025
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	11	12	9	100	108
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	0.4	0.4	0	99	107
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	101	107
Copper-Dissolved	µg/L	1	Metals-022	<1	1	9	9	0	100	107
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	105	105
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	97	86
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	7	6	15	101	107
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	51	50	2	98	109

QUALITY CONTROL: Ion Balance					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			19/08/2025	1	19/08/2025	19/08/2025		19/08/2025	[NT]
Date analysed	-			19/08/2025	1	19/08/2025	19/08/2025		19/08/2025	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	8.0	[NT]		106	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	1	[NT]		107	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	31	[NT]		98	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3	[NT]		106	[NT]
Hardness (calc) equivalent $CaCO_3$	mg/L	3	Metals-020	[NT]	1	34	[NT]		[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	18	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	<5	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	1	18	[NT]		106	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	35	35	0	103	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	37	37	0	90	[NT]
Ionic Balance	%		Inorg-040	[NT]	1	-1.0	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			19/08/2025	1	19/08/2025	19/08/2025		19/08/2025	[NT]
Date analysed	-			19/08/2025	1	19/08/2025	19/08/2025		19/08/2025	[NT]
pH	pH Units		Inorg-001	[NT]	1	6.0	[NT]		99	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	300	[NT]		94	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	16	[NT]		80	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	140	[NT]		118	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	5	[NT]		96	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.005	0.005	0	105	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.008	0.007	13	113	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	<0.005	0	103	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.01	0.01	0	113	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.3	[NT]		85	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	<0.005	0	109	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	1	0.3	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	1	0.3	[NT]		[NT]	[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	-			20/08/2025	1	20/08/2025	20/08/2025		20/08/2025	[NT]
Date analysed	-			21/08/2025	1	21/08/2025	21/08/2025		21/08/2025	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	<0.05	<0.05	0	101	[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
Micro analysed by Sonic, report no W2518772.

Douglas PARTNERS | GROUNDED EXPERTISE

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	236982.01	**Suburb:**	Mosman, Muston	**To:**	Envirolab Services
Project Manager:	Lisa Teng	**Order Number:**	**Sampler:** Philip Waters		12 Ashley St, Chatswood NSW 2067
Email:	Lisa.Teng@douglaspartners.com.au		philip.waters@douglaspartners.com.au	**Attn:**	Sample Receipt
Turnaround time:	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.com.au
Prior Storage:	☐ Fridge ☐ Freezer ☑ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes (If YES, then handle, transport and store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Sample ID: Depth From	Sample ID: Depth To	Date Sampled	Sample Type (S - soil, W - water, M - Material)	Container Type (G - glass, P - plastic)	Combo 8 (trace)	Anions and cations	nutrients	pH and EC	TDS/TSS	TOC	faecal coliforms and thermotolerant	Alkalinity	Combo 3	TRH/BTEX		Notes/ Preservation/ Additional Requirements
1	BH2			18/08/25	W	G,P	x	x	x	x	x	x	x	x				sampled at 9:10 am
2	BD20250818			18/08/25	W	G,P									x			
3	TS			18/08/25	W	G,P										x		
4	TB			18/08/25	W	G,P												

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200
ENVIROLAB GROUP
Job No: 388786
Date Received: 19/8/25
Time Received: 1600
Received By: RH
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:			**LAB RECEIPT**
Number of samples in container:	**Transported to laboratory by:** Courier		**Lab Ref. No:** 388786
Send results to: Douglas Partners Pty Ltd			**Received by:** Richard Hung
Address: 96 Hermitage Road, West Ryde NSW 2114	**Phone:** (02) 9809 0666		**Date & Time:** 19/8/25 1600
Relinquished by: LT	**Date:** 19/8/25	**Signed:** [signature]	**Signed:** [signature]

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

SAMPLE RECEIPT ADVICE

Client Details	
Client	Douglas Partners Pty Ltd
Attention	Lisa Teng

Sample Login Details	
Your reference	236033.01, Mosman, Muston
Envirolab Reference	388786
Date Sample Received	19/08/2025
Date Instructions Received	19/08/2025
Date Results Expected to be Reported	26/08/2025

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

Comments

TB - dated as 6/8 on jar
TS - dated as 5/8 on jar

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	OCPs in Water - Low Level	OP in water LL ANZECCF/ADWG	PCBs in Water - Low Level	Total Phenolics in Water	HM in water - dissolved	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	pH	Electrical Conductivity	Total Suspended Solids	Total Dissolved Solids (grav)	Total Organic Carbon	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	NOx as N in water	Total Nitrogen in water	Phosphate as P in water	TKN in water	Organic Nitrogen as N	Metals in Waters - Acid extractable	Microbiological Testing
BH2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BD20250818	✓	✓	✓					✓																											
TS	✓																																		
TB	✓																																		

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.