eiaustralia

Contamination | Remediation | Geotechnical

HYECORP PROPERTY GROUP PTY LTD

Hydrogeological Report including Dewatering Management Plan and Groundwater Seepage Analysis

37 Archer Street, Chatswood NSW

E26577.E16_Rev2
5 November 2025

DOCUMENT CONTROL

Report Title: Hydrogeological Report including Dewatering Management Plan and Groundwater Seepage Analysis; 37 Archer Street, Chatswood NSW

Report No: E26577.E16_Rev2

Copies	Recipient
1 Soft Copy (PDF – Secured, issued by email)	Hyecorp Property Group Pty Ltd Suite1, 256 Victoria Avenue, **CHATSWOOD NSW 2067**
1 Original (Saved to Digital Archives)	EI Australia Suite 6.01, 55 Miller Street, **PYRMONT NSW 2009**

Author	Project Manager	Technical Reviewer
		
Mariana Barbosa Environmental Engineer	**Sharon Li** Senior Environmental Engineer	**Nik Kontos** Principal Environmental Engineer

Revision	Details	Date	Amended By
0	Original	14 May 2025	-
1	Updated GSA report	23 May 2025	AB/MB/NK
2	Updated sections 3.4.7 and 3.4.7	5 November 2025	MB/NK

TABLE OF CONTENTS

SCHEDULE OF TABLES (IN-TEXT)

APPENDICES

EXECUTIVE SUMMARY

Background

EI Australia (EI) was engaged by Hyecorp Property Group Pty Ltd, to prepare a Hydrogeological Report including Dewatering Management Plan and Groundwater Seepage Analysis for 37 Archer Street, Chatswood in New South Wales ('the site').

The site is located approximately eight kilometres north west of the Sydney central business district, within the local government area of Willoughby City Council. It is further identified as Strata Plan 38065, comprising an area of 2,201m^2. At the time of this investigation, the land being was being used for residential purposes, by way of multiple townhouses overlying a single level basement.

The site was designated for redevelopment and environmental reporting was required in support of the corresponding State Significant Development (SSD) and Planning Secretary's Environmental Assessment Requirements (SEARs). EI's report addresses Condition 13, which relates to the ground and water conditions component of the SEARs.

The purpose of this report is twofold, as follows:

1) To address the Secretary's Environmental Assessment Requirements (SEARs); and

2) To provide a dewatering management plan, which describes baseline groundwater conditions, quantifies construction groundwater take volumes and provides strategies for mitigating potential adverse impacts on neighbouring properties and infrastructure, local groundwater users and the environment.

The dewatering management procedures outlined within this report are to be followed during construction and operational phase of the building.

1. INTRODUCTION

1.1 Background and Purpose

EI Australia (EI) was engaged by Hyecorp Property Group Pty Ltd ('the client') to prepare a Hydrogeological Report including Dewatering Management Plan and Groundwater Seepage Analysis (the 'report') for 37 Archer Street, Chatswood NSW ('the site').

The site is located within the local government area of Willoughby City Council, as shown on **Figure A1**, **Appendix A**. It is further identified as Strata Plan 38065, comprising an area of 2,201m^2 (**Figure A2**). At the time of this investigation, the land being was being used for residential purposes, by way of multiple townhouses overlying a single level basement.

The site is proposed for redevelopment (described in more detail below), and will involve the demolition of the existing site structures and the construction of a twenty-eight storey, residential (apartment) building, overlying a six level basement, requiring bulk excavation works that will intersect the groundwater system, triggering the need for site dewatering. Groundwater drawn into the dewatering system is proposed to be appropriately treated to comply with relevant water quality criteria for subsequent discharge into the local municipal stormwater system, subject to Council approval.

Hydrogeological conditions, including baseline groundwater quality and pre-dewatering groundwater levels, are described in **Section 3**, with tabulated field-based and laboratory data presented in **Appendix B**.

Due to characteristically low hydraulic conductivity of the water bearing lithology a drained basement design is proposed for long-term dewatering during the operational phase of the development, as detailed in **Section 4**.

Cumulative drawdown and water quality effects from long-term dewatering are assessed against the NSW Aquifer Interference Policy (AIP) in **Section 7**, to demonstrate that the proposed drained basement would meet the minimal impact considerations, as described in the AIP.

The purpose of this report is twofold, as follows:

3) To address the Secretary's Environmental Assessment Requirements (SEARs), which are listed in **Table 1-1**; and

4) To provide a dewatering management plan, which describes baseline groundwater conditions, quantifies construction groundwater take volumes and provides strategies for mitigating potential adverse impacts on neighbouring properties and infrastructure, local groundwater users and the environment.

Table 1-1 Secretary's Environmental Assessment Requirements

SEARS Requirement	Relevant Section of Report
13.0 Ground and Water Conditions 1. *Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity and acid sulfate soils.* 2. *Provide a Surface and Groundwater Impact Assessment that assesses potential impacts on:* a. *surface water resources (quality*	Groundwater resource use – **Section 2.4** Downstream surface water receptors – **Section 2.6** Groundwater dependent ecosystems – **Section 2.7** Soil salinity – **Section 2.8** Acid sulfate soils (See SEARS 17.0) – **Section 2.9** Soil erosion – **Section 2.10** Construction dewatering groundwater take in ML/year – **Section 4.2**

SEARS Requirement	Relevant Section of Report
and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses. *b. groundwater resources in accordance with the Groundwater Guidelines.*	Potential impact to any surrounding properties via drawdown induced ground settlement – **Section 4.6** Discharge water quality for temporary disposal to municipal storm water system during construction dewatering phase – **Section 5.2** Consideration of the Aquifer Interference Policy and minimal harm assessment – **Section 7.1**

1.2 Proposed Development

Based on the provided documents in **Appendix C**, EI understands that the proposed development involves demolition of the existing site structures and the construction of a mixed uses building overlying a six-level underground basement. The lowest basement level is proposed to have a Finished Floor Level (FFL) of about RL 71.85m.

A Bulk Excavation Level (BEL) of about RL 71.5 m is assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depth of up to about 20m Below Existing Ground Level (BEGL) have been estimated.

Locally deeper excavations may be required for footings, lift overrun pits, crane pads, and service trenches.

A drained basement using sub-soil drainage and a sump and pump system is assumed as the dewatering method for the project. The dewatering method is described in more detail in **Section 4**

1.3 Report Objectives

The objectives of this report are to:

- Describe the conceptual hydrogeological model for the site and summarise baseline groundwater conditions, including pre-dewatering groundwater depth and groundwater quality;
- Summarise relevant hydrogeological and groundwater modelling information, with reference to the groundwater seepage analysis (GSA) report, which is attached in **Appendix D**;
- Describe the dewatering methodology, groundwater treatment requirements, monitoring and reporting procedures to be employed;
- Provide effective management and contingency procedures, to ensure that dewatering discharge does not pose unacceptable risks to the receiving environment, in compliance with the *Protection of the Environment Operations Act 1997*;
- Detail post-construction monitoring and reporting procedures for the occupational phase of the development; and
- Provide relevant information on anticipated groundwater impacts, with reference to the *NSW Aquifer Interference Policy* to properly inform the regulatory approval process.

It is understood that this report will accompany the SSD application, seeking development consent under Division 4.7 State Significant Development of the Environmental Planning & Assessment Act 1979 (EP&A Act).

1.4 Scope of Work

With reference to the above report objectives, the following works were undertaken:

- A desktop study including:
  - Review of the development proposal and proposed shoring/dewatering designs;
  - Review of hydrogeological, landscape and acid sulfate soil risk maps for the area;
  - Review of previous investigation reports and plans, which included:
    - A search of registered bores located within a 500 m radius of the site to review local groundwater usage;
    - Onsite drilling data, including sub-surface stratigraphic data and depth to water bearing zones; and
    - Potential onsite and offsite sources of contamination that may impact on dewatering discharge water quality.
- A groundwater monitoring event (GME) involving sampling from existing monitoring wells, field-based and laboratory water quality analysis to characterise baseline groundwater quality prior to dewatering.

This report also refers to information provided in the GSA report, which includes the findings from field-based hydraulic testing and computer-based groundwater modelling. Findings from the GSA report are incorporated into various parts of this hydrogeological report.

1.5 Regulatory Framework

The following regulatory framework and guidelines were considered during the preparation of this plan:

Table 1-2 Regulatory Framework

NSW Legislation and Regulatory Instruments	Requirements / Objectives
Contaminated Land Management Act 1997 (CLM Act)	Promotes the effective management of contaminated land in NSW by setting out the roles and responsibilities of the NSW EPA and its rules.
Environmental Planning and Assessment Act 1979 (EP&A Act)	The EP&A Act stipulates the regulations and gives rise to state environmental planning policy (SEPP) to assist regulators with the protection of human and environmental health.
Protection of the Environment Operations Act 1997 (POEO Act)	The objective of the *POEO Act* is to achieve the protection, restoration and enhancement of the quality of the environment.
NSW Water Management (General) Regulation 2018.	Details relating to Water Access License requirements, if relevant.
Water Management Act 2000 and *Water Act 1912* (WM Act)	Protects the health of rivers, streams and groundwater systems and gives rise to Water Sharing Plans and quality objectives for catchments within the state of NSW. Manages aquifer interference activities which involve: ▪ The penetration of an aquifer; ▪ The interference of water in an aquifer; ▪ The obstruction of water flow or taking of water from an aquifer when carrying out prescribed activities; and ▪ The disposal of water taken from an aquifer.
NSW Aquifer Interference Policy (2012)	Details the scope of aquifer interference activities, minimal impact assessment and provides specific guidance on the licensing and approval requirements for activities that interfere with aquifers.

NSW Legislation and Regulatory Instruments	Requirements / Objectives
Council Plans and Policies	Provides controls and guidelines for development in the area. ▪ *Willoughby Development Control Plan 2023; and* ▪ *Willoughby Local Environmental Plan 2012.* Note: For projects involving site dewatering, Council typically requires details for the proposed water disposal connection to the stormwater system, preferably in the form of engineering drawings and plans.
Relevant Guidelines (but not limited to)	▪ ANZG (2018) *Guidelines for Fresh and Marine Water Quality;* ▪ ANZECC & ARMCANZ (2000) *Guidelines for Fresh and Marine Water Quality, Vol. 1, Chapter 3, Aquatic Ecosystems*; ▪ DPE (2022) *Minimum requirements for building site groundwater investigations and reporting*; ▪ NHMRC (2008) *Guidelines for Managing Risks in Recreational Water;* and ▪ *NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination.*

2. SITE DESCRIPTION

2.1 Property Identification, Location and Physical Setting

Site identification details and associated information are summarised in **Table 2-1**. Figures illustrating the site location and assessment area are provided in **Appendix A**.

Table 2-1 Site Identification, Location and Zoning

Information	Detail
Site Address	37 Archer Street, Chatswood NSW
Location Description	Bounded by Archer Street to the west, residential properties to the north and south and Bertram Street to the east.
Lots and DP	Strata Plan 38065
Local Government Area	Willoughby City Council
Current Zoning	MU1 – Mixed Use (*Willoughby Local Environment Plan 2012*)
Current Site Use	At the time of the fieldwork for the preparation of this report, the site was occupied by multiple residential townhouses overlying a single-level basement
Location Coordinates	North-eastern corner of site (datum GDA2020-MGA56): Easting: 332164.334 Northing: 6258737.578 (Source: http://maps.six.nsw.gov.au)
Site Area	2,201 m^2 (**Appendix C**)
Typical Soil Profile	Based on previous investigations, the subsurface was expected to consist of sand- and clay- dominated filling (with gravel and occasional anthropogenic materials (e.g. brick fragments and metal) generally 0.13-1.5m thickness), overlying natural (residual) silty clays, ultimately grading into weathered shale and sandstone, becoming fresher bedrock with increasing depth.

2.2 Surrounding Land Use

Surrounding land uses within close proximity (within 250m) to the site are described in **Table 2-2**.

Table 2-2 Local Land Use

Direction	Land Use Description
North	Residential property, followed by Albert Avenue
South	Residential property, followed by Johnson Street
East	Bertram Street, followed by residential properties
West	Archer Street, followed by residential properties

2.3 Regional Setting

A description of the regional setting, including ground surface topography, hydrogeology, acid sulphate soil conditions and soil landscape, is summarised in **Table 2-3**.

Table 2-3 Regional Setting Information

Attribute	Description
Topography	Site elevations range from 90 metres Australian Height Datum (m AHD) at the northern boundary, to 92m AHD towards the southern boundary(refer to survey plan attached in **Appendix C**).
Site Drainage	Likely to be consistent with the general slope of the site (i.e. towards the north). Stormwater runoff would be expected to be collected by pit and pipe systems discharging to the municipal stormwater system.
Regional Geology	The Department of Mineral Resources *Penrith 1:100,000 Geological Series Sheet 9030* (DMR, 1991) indicates the site overlies Wianamatta Group Ashfield Shale (*Rwa*), which consists of black to dark-grey shale and laminate.
Soil Landscape	According to the *Soil Landscapes of the Sydney 1:100 000 Sheet* (Chapman and Murphy, 1983), the site overlies a Glenorie (*gn*) erosional landscape. This landscape is characterised by undulating to rolling low hills on Wianamatta Group shales (local relief 50-80m, slopes 5-20%, with narrow ridges, hillcrests and valleys, shallow to moderately deep (<1m) red and brown podzolic soils).
Acid Sulfate Soil (ASS) Risk	With reference to the *Prospect / Parramatta River Acid Sulfate Soil Risk Map* (1:25,000 scale; Murphy, 1997), the subject land lies within the map class description of 'No Known Occurrence'. In such cases, ASS is not known or expected to occur and "land management activities are not likely to be affected by ASS materials". With reference to the *Willoughby Local Environmental Plan 2012* Acid Sulfate Soils Map, the site lies within a Class 5 area. The risk of ASS presence on-site was therefore considered to be low and further ASS assessment was deemed unwarranted.
Nearest Surface Water Features	Scotts Creek located approximately 840m north east of the site. Swaines Creek, located approximately 1.6km west of the site. Lane Cove River, located approximately 2.6km west of the site.
Groundwater Flow Direction	Groundwater flow direction in the vicinity of the site was anticipated to flow north towards Scotts Creek; however, groundwater contour analysis based on water level monitoring data during this assessment (**Figure A3**, **Appendix A**) indicated groundwater to be flowing west towards Swaines Creek.

2.4 Local Groundwater Use

An online search for groundwater bores registered with WaterNSW was conducted on 28 November 2024 (https://realtimedata.waternsw.com.au/water.stm). The search revealed seven registered bores within a 500 m radius of the site (see **Appendix E**). Details for the nearest bores are summarised in **Table 2-4**. Note that standing water level (SWL) data were unavailable for six of the seven bores.

Only the licenses for the three nearest bores remain active, and all three bores were installed for monitoring purposes. The data showed that the local groundwater resource is not utilised for groundwater supply purposes.

Table 2-4 Summary of Registered Groundwater Bores within 500m of the site

Bore	Date Drilled	Approx. distance & direction from site (m)	Depth (m BGL)	SWL (mBGL)	Purpose	Licence Status
GW112963	15.03.2012	287m south	9.0	-	Monitoring	Active
GW112965	15.03.2012	312m south	9.0	-	Monitoring	Active
GW112964	15.03.2012	315m south	2.0	-	Monitoring	Active
GW111333	24.01.2011	334m south	9.0	-	Monitoring	Cancelled
GW111332	24.01.2011	334m south	3.2	-	Monitoring	Cancelled
GW107757	29.07.2025	429m west	162.60	25.6	Test bore	Cancelled
GW029731	01.04.1967	454m west	21.60	-	Recreation	Cancelled

As there are no registered bores being used for water supply there are no groundwater users that would be adversely affected by potential drawdown effects as a result of site dewatering. Potential dewatering impacts are assessed further, with reference to the NSW Aquifer Interference Policy, in **Section 7**.

2.5 Potential Sources of Contamination

Potential onsite contamination sources as noted from the Preliminary Site Investigation (EI, 2025a) were as follows:

- Imported fill materials of unknown origin and quality, used to grade and level the site;
- Hazardous building materials (including potential asbestos-containing materials (ACM) and lead-based paints) present within the site structures;
- Application of pesticides around building (footing) perimeters; and
- Leaks from vehicles in the garage and parking areas.

In addition, the clustered monitoring wells identified during the search of registered bores (**Section 2.4**) also indicated the following potential offsite contamination sources:

- TLC Dry Cleaners located on the second floor of Westfield Chatswood, approximately 300 m northwest of the site, which is down hydraulic gradient in relation to the site, with due regard for the ambient groundwater flow direction (see **Section 3.3**);

Potential onsite contamination attributed to imported fill materials, application of pesticides, hazardous building materials and shallow leakage of oil fluids from vehicles will be removed during bulk excavation for basement construction; therefore, the potential for residual onsite contamination to impact water quality during dewatering is deemed to be low.

The potential offsite contamination source at the dry cleaning business at Westfield Chatswood is unlikely to affect the beneficial use category for the groundwater source as a direct result of site dewatering, as groundwater is not being utilised in the areas surrounding the site (as described in **Section 2.4**).

Notwithstanding, construction dewatering should be mindful of potential contaminants that may be drawn into the extracted groundwater, which will be pumped through the water treatment system, to ensure that only compliant water quality is discharged to storm water. Water quality management is addressed in more detail in **Section 5.**

2.6 Potential Environmental Receptors

It is proposed that during construction, extracted groundwater will be pumped through a water treatment system (if required – refer to **Section 5.5**) and then discharged into the local municipal stormwater system.

As documented in the NSW Tidal Limits list (Ref. NSW Gov., 2006) Swaines Creek is tidally influenced to a point located 380 m upstream of the Lane Cove River. Treated water entering the storm water pipe close to the site is therefore assumed to be discharged to a freshwater ecosystem in the upper part of Swaines Creek. The fresh water criteria are therefore to be applied for discharge water quality considerations, as detailed in **Section 5.2**.

2.7 Groundwater Dependent Ecosystems

A search of the *NSW Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023 – Schedule 4* was conducted on 05 May 2025. Swaines Creek was not listed as a high priority groundwater dependent ecosystem (GDE) and there are no other listed high priority GDEs in the general vicinity.

This information was used in the minimal harm assessment considerations under the NSW Aquifer Interference Policy, as described in **Section 7.1** of this report.

3. GROUNDWATER CONDITIONS

3.1 Previous Investigations

The following previous reports were used to gain an understanding of hydrogeological conditions at the site:

- EI (2025a) *Preliminary Site Investigation; 37 Archer Street, Chatswood, NSW 2067*, Reference E26577.E01_Rev0, 30 April 2025 – the PSI report.
- EI (2025b) *Preliminary Geotechnical Investigation; 37 Archer Street, Chatswood, Chatswood, NSW 2067*, Reference E26577.G03_Rev2, 23 May 2025.

  EI (2025c) *Acid Sulfate Soil Management Plan; 37 Archer Street, Chatswood, NSW 2067*, Reference E26577.E14_Rev0, 30 April 2025.
- EI (2025d) *Groundwater Level Monitoring Report No. 1, 37 Archer Street, Chatswood, Chatswood, NSW 2067,* Report Ref. E26577.G11.GW01, dated 7 May 2025.
- EI (2025e) *Groundwater Seepage Analysis, 37 Archer Street, Chatswood, Chatswood,* Report Ref. E26577.G12_Rev1, 23 May 2025.

The GSA report (**Appendix D**) provides details of the proposed excavation and site-specific findings based on groundwater modelling, including predicted water level drawdowns, groundwater seepage inflow and discharge volumes, and drawdown-induced ground settlement rates at varying distances from the basement excavation.

3.2 Conceptual Hydrogeological Model

Based on current investigation findings and EI's experience from sites with similar sub-soil conditions, the Conceptual Hydrogeological Model for the site is summarised as follows:

- Subsurface soil profile:
  - Concrete pavement: up to 0.3m thickness;
  - Topsoil and fill layer (silty sand and silty clay): 0.13 m to 1.5 m in thickness;
  - Residual soil layer (silty clay and gravelly clay): to the depths of 2.06 m to 3.41 m BGL; and
  - Siltstone, Shale and Sandstone bedrock: underlying the residual soil layer.
- Groundwater is under pressure and moves through the underlying shale/sandstone bedrock, which has been tested with characteristically low hydraulic conductivities ranging between 1.0 x 10^{-5} m/s and 1.0 x 10^{-8} m/s, as documented in the GSA report (**Appendix D**).
- Groundwater levels ranging between 1.40 and 10.37 mBGL have been observed in monitoring wells located inside and outside of the proposed basement excavation footprint area**.**
- Site dewatering will primarily drain the residual soil and shale units.

3.3 Pre-Dewatering Groundwater Depth and Hydraulic Gradient

EI completed continuous groundwater level monitoring within the monitoring wells installed by EI (BH1Mand BH3M) from 10 February 2025 to 22 April 2025 (EI, 2025d). Monitoring results were reported graphically as hydrographs with rainfall data overlays, as shown in the report *Groundwater Level Monitoring No.1*, which is included in **Appendix D**. Maximum and minimum

groundwater levels recorded during each month of continuous water level monitoring are summarised in **Table 3-2**.

EI note that a data logger was installed at borehole BH2M; however, at the end of the three month continuous monitoring period, upon returning to the site to download the data and decommission the loggers, it was noted that the logger had been removed (taken) from bore BH2M, presumably as an act of vandalism. The sources of the data summarised in **Table 3-1** were therefore as follows:

- The maximum and minimum recorded groundwater levels for monitoring wells BH1M and BH3M are based on continuous (3-month) monitoring data;
- The maximum and minimum recorded groundwater levels for monitoring well BH2M are based on groundwater levels collected by manual dipping during the above mentioned GMEs; and
- The review of groundwater flow regime is based on groundwater contours interpreted from manually dipped groundwater levels measured on the day of the indicated GMEs.

Table 3-1 Summary of Continuous Groundwater Monitoring Results

Well ID	Ground Surface RL(m AHD)[1]	Average GW RL (m AHD)[2]	Max recorded GW RL (m AHD) / Date / Time	Min recorded GW RL (m AHD) / Date / Time	Contoured groundwater levels	
					GW depth on 22.02.2025 (m AHD)	GW depth on 10.02.2025 (m AHD)
BH1M	90.40	85.83	85.91 05.04.2025 / 8:00pm	85.69 16.03.2025 / 2:45pm	85.79	85.79
BH2M	88.00	86.50 [1]	**86.53** 22.04.2025	86.43 10.02.2025	86.53	86.48
BH3M	90.90	80.56	81.03 10.02.2025 / 2:00pm	**80.44** 14.02.2025 / 1:15pm	80.53	80.86

GW – Groundwater; RL – Reduced (surveyed elevation); m AHD – metres relative to Australian Height Datum

Note 1 – The Ground surface RL at each monitoring well was extrapolated from the ground elevation survey plan provided in EI, 2025e.

Note 2 – The average groundwater RL, as calculated for the recorded groundwater levels at BH1M and BH3M by continuous data logger, for the continuous groundwater level monitoring period. For BH2M an average of the manual groundwater measurements was calculated from the available GME data.

Groundwater level data for all three monitoring wells on the GME dates indicated in **Table 3-1** were therefore used for the analysis of hydraulic gradient and groundwater flow direction using the Surfer® contouring package. Groundwater level contours were manually smoothed to produce **Figure A3** in **Appendix A**. The groundwater contouring analysis showed that:

- On 22 February 2025 groundwater was inferred to be flowing in a west direction towards Swaines Creek, under a hydraulic gradient of 0.197
- On 10 February 2025 groundwater was inferred to be flowing in a west direction towards Swaines Creek, under a hydraulic gradient of 0.196

It was therefore concluded that groundwater flow direction did not vary significantly in response to rainfall-induced groundwater level fluctuations.

As discussed in the GSA report, a design groundwater level of RL 87.6 m AHD was adopted for analysis of groundwater seepage inflow rates and groundwater seepage volumes within the basement excavation. This value was conservatively set at around 1.0 m above the highest record level to allow for potential seasonal groundwater level fluctuations, which was deemed to be reasonable based on EI experience of groundwater level fluctuations on other sites with similar hydrogeological conditions, within this part of the Sydney region.

3.4 Baseline Groundwater Quality Assessment

The data used for the baseline groundwater quality assessment was sourced from the results of the most recent GME carried out on 22 April 2025, as described below.

3.4.1 Monitoring Well Locations

Data from the monitoring wells (BH1M to BH3M) were used to characterise pre-dewatering groundwater quality. All well locations are illustrated on **Figure A2**.

3.4.2 Data Quality Assessment

A sampling, analytical and quality plan (SAQP) was developed to ensure that the data collected were representative and provide a robust basis for assessment decisions. The SAQP for the baseline GME included consideration of the following:

- Data quality objectives (DQO), including a summary of the objectives of the GME;
- Data quality indicators (DQI), applied to the field and laboratory quality control samples;
- Sampling methodology, including the wells to be sampled (sampling points), screening procedures, handling, preservation and storage, and details of the analytes be monitored;
- Laboratory analysis methods;
- Appropriate water quality assessment criteria; and
- Analytical quality assurance / quality control (QA/QC).

Laboratory chain-of-custody, sample receipt documentation and internal laboratory QA/QC data are attached in **Appendix G**. A data quality assessment in relation to field tests and laboratory QA/QC is presented together with laboratory analytical reports in **Appendix H**. EI's data validation process found that the overall quality of field-based and laboratory analytical data produced for baseline groundwater samples were of an acceptable standard for interpretive use.

3.4.3 Groundwater Sampling Methodology

The groundwater sampling methodology followed during the GME is described in **Table 3-3**.

Table 3-1 Summary of Groundwater Sampling Methodology

Activity/Item	Details
Fieldwork	One GME involving water level gauging, well purging, measurement of physiochemical parameters and groundwater sampling was conducted on 22 April 2025 at previously installed groundwater wells BH1M, BH2M and BH3M, as described below.
Well depth	▪ BH1M: total well depth 17.28 m BGL; ▪ BH2M: total well depth 16.78 m BGL; ▪ BH3M: total well depth 21.20 m BGL; Monitoring bore logs are presented in **Appendix F**.
Well Gauging	Monitoring wells were gauged to determine standing water level (SWL) prior to groundwater purging and sampling. Gauging was conducted with a water level dipper, and recorded water levels are documented in Table 3 of the GSA report (**Appendix D**).

Activity/Item	Details
Well Purging, Water Quality Measurements and Sampling	Groundwater was purged and sampled by low-flow / minimal draw-down method, using a MicroPurge kit (MP15) with dedicated tubing. During the purging process, continuous field measurements were obtained for water temperature (Temp), electrical conductivity (EC), reduction-oxidation potential (Redox), dissolved oxygen (DO) and water pH, using a *Hanna Multi Parameter 9829* positioned within an open flow-through cell. Once water quality parameters stabilised (i.e. within ± 10% for DO, ± 3% for EC, ± 0.05 for pH, ± 0.2° for temperature and ± 20mV for Redox), the measured values were recorded. Groundwater sampling was then undertaken by diverting the outlet of the pump (immediately before the flow cell) to the sampling vials and bottles.
Decontamination Procedure	Sampling equipment (interface probe and water quality kit probes) were decontaminated between sampling locations by washing in a solution of potable water and Decon 90, followed by rinsing with potable water. Decontamination was not required for the sampling pump, as dedicated disposable tubing was used for sampling at each individual well. Dedicated gloves were used for the handling of equipment and collection of each sample.
Sample Preservation	Pre-preserved sample containers were supplied by the laboratory as follows: ▪ one, 1 litre amber glass, acid-washed and solvent-rinsed bottle; ▪ two, 40ml glass vials, pre-preserved with dilute hydrochloric acid and Teflon-sealed; ▪ one, 250mL, HDPE bottle, pre-preserved with dilute nitric acid (1mL); ▪ Additional bottles and preservatives were used for the more detailed suite of tested parameters, as listed and described in **Section 3.4.5**. Samples for metals analysis were field-filtered using 0.45 µm pore-size membranes. All containers were filled with sample to the brim then capped and stored in insulated chests (containing chilled ice bricks), until completion of the fieldwork and during sample transit to the laboratory.
Sample Transport	After sampling, the chilled chests were transported to SGS Pty Ltd (SGS; the primary laboratory) using strict COC procedures. Sample Receipt Advice (SRA) was provided by the laboratory to document sample condition upon receipt. Copies of the SRA and COC certificates are presented in **Appendix G**.
Quality Control, Laboratory Analysis and Sample Transport	Groundwater samples were analysed by SGS for the requested analytes as detailed on the COC form. All samples were analysed within the required holding period, as documented in the corresponding laboratory reports (included in **Appendix G**). In addition to an inter-laboratory duplicate sample (analysed by Envirolab Services Pty Ltd, the secondary laboratory), QC analyses comprised a blind (intra-laboratory) field duplicate analysed by SGS.

3.4.4 Tested Parameters

As summarised in **Table 3-4**, groundwater samples from wells BH2M and BH3M were analysed for a condensed, *Standard suite* of analytes; however, the sample from well BH1M was analysed for an extended *Baseline suite* of analytes, which included all mandatory groundwater quality test parameters listed under Appendix A of DPE (2022), plus a number of additional parameters selected by the EI investigation team, as shown in **Table B1** in **Appendix B**.

In summary, the *Baseline test suite*, included:

- ***Physical parameters:*** Electrical Conductivity (EC), pH, redox potential (Eh), Total Dissolved Solids (TDS), Total Hardness, temperature, Dissolved Oxygen (DO) and Turbidity;
- ***Major Anions:*** sulfate (SO_4), chloride (Cl), carbonates (CO_3), bromide (Br), fluoride (F);
- ***Major Cations*****:** calcium (Ca), magnesium (Mg), sodium (Na), potassium (K);

- ***Ionic balance:*** cation/anion balance (%);
- ***Dissolved inorganics & metals:*** aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), total chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO2), silver (Ag), strontium (Sr), uranium (U), vanadium (V) and zinc (Zn);
- ***Nutrients:*** ammonia (NH_3), nitrate (NO_3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P) and reactive phosphorus (P);
- ***Microbiological organisms:*** Faecal coliforms, faecal streptococci and Escherichia Coli;
- ***Organics:*** Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Total Recoverable Hydrocarbons (TRHs); and
- ***Other:*** the following additional parameters were also analysed as part of the site characterisation process:
  - Volatile Organic Compounds (VOCs), including Volatile Organic Compounds (VOC);
  - Total cyanide and total phenols; and
  - Perfluoroalkyl and polyfluoroalkyl substances (PFAS).

The *Standard test suite*, included:

- ***Physical parameters:*** pH, EC, TDS and Hardness;
- ***Dissolved metals:*** aluminium, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc; and
- **Organics:** TRHs, BTEX, PAHs, VOCs, SVOCs, chlorinated aliphatic compounds, total cyanide and total phenols.

Table 3-2 Summary of Groundwater Quality Test Parameters

Sampling Date	Monitoring Well	Testing
22/04/25	BH1M	Baseline suite
	BH2M	Standard suite
	BH3M	Standard suite

3.4.5 Assessment Criteria

The adopted discharge water criteria (the 'DWC') were based on the default guideline values (DGVs) for Freshwater ecosystems as published under ANZG (2018) *95% Freshwater Default Guideline Values* (*DGVs)* and 99% *Freshwater DGVs* for bio-accumulative toxicants (cadmium and mercury). For parameters that are not currently addressed by the ANZG fresh water DGVs, relevant alternative criteria were adopted, as detailed in **Section 5.2**.

The criteria values are presented alongside the analytical results in the corresponding summary tables (**Table B1** and **Table B2** in **Appendix B**).

3.4.6 Field-based Water Quality Testing and Observations

The field water quality parameters DO, pH, EC, Temperature and Redox potential, were measured onsite using a flow cell and values were recorded as presented in **Table 3-5**.The groundwater samples were also evaluated on the basis of odour and visual signs of contamination, with the following observations noted:

- Groundwater was found to be light grey in colour, with low to medium turbidity;
- The measured SWLs ranged between 1.40 and 10.37 mBGL (i.e. 80.54 and 86.10mAHD;

- No odours or visual evidence of contamination were detected during well purging or groundwater sampling; and
- No petrochemical films or oily sheens were observed on the surface of the purged / sampled groundwater.

The field measurements indicated that the groundwater was supersaturated in oxygen (DO > 10 mg/L), acidic to strongly acidic (pH: 3.68-4.64), saline (EC: > 3,000 µS/cm), with electrode adjusted redox potential (Eh) above 200 mV, indicating strongly oxidizing groundwater conditions.

Table 3-3 Groundwater Field Data

Well ID	SWL [1] (mBGL)	DO [2] (mg/L)	pH	EC [3] (µS/cm)	Temperature (°C)	Redox [4] (mV)
BH1M	4.61	10.13	4.38	3815	17.50	210.2
BH2M	1.40	25.38	3.68	3220	16.64	205.8
BH3M	10.37	26.54	4.64	3166	16.96	207.7

Note 1 SWL – standing water level in metres below ground level (m BGL)
Note 2 DO – Dissolved Oxygen.
Note 3 EC – Electrical Conductivity.
Note 4 Redox readings were adjusted to the Standard Hydrogen Electrode potential by adding field probe potential (205mV) to field readings.

3.4.7 Laboratory Analytical Results

With reference to the tabulated summaries of field-based and laboratory analytical results, as assessed against the DWC in **Table B1** and **Table B2** (laboratory documentation is attached in **Appendix G**), the results showed compliant groundwater concentrations in most samples, with the following exceptions:

- Cadmium (0.1 µg/L) at monitoring well BH2M was above the DWC value (0.06 µg/L);
- Nickel at all monitoring well BH1M (86 µg/L), BH2M (89µg/L), BH3M (40 µg/L) was above the DWC value (11 µg/L);
- Zinc at monitoring well BH1M (290 µg/L) , BH2M (340 µg/L)was above the DWC value (80 µg/L);
- Aluminium at all monitoring well BH1M (550 µg/L), BH2M (4000 µg/L), BH3M (120 µg/L), was above the DWC value (55 µg/L);
- Cobalt (85 µg/L) at monitoring well BH1M was above the DWC value (1.4 µg/L);
- Manganese (2300 µg/L) at monitoring well BH1M was above the DWC value (1900 µg/L);
- Total Nitrogen (730 µg/L) at BH01 was above the DWC value (500 µg/L);
- Total Phosphorus (560 µg/L) at BH01 was above the DWC value (50 µg/L);
- Total recoverable hydrocarbons in the form of TRH C10 – C40 (2,300 µg/L) were detected using the silica gel clean-up method on groundwater sampled at BH01;
- Laboratory-tested pH values in samples from wells BH1M (5.0) , BH2M (4.0) and BH3M (4.9) were outside of the DWC value range (6.5-8.0);
- Field-pH values at BH1M (4.38), BH2M (3.68) and BH3M (4.64) were also outside of the DWC range;
- Laboratory-tested Electrical Conductivity values at all monitoring wells BH1M (3815 µS/cm), BH2M (3220 µS/cm) and BH3M (3166 µS/cm) were above the DWC value (2000 µS/cm); and

- Turbidity results for wells BH1M (6700 NTU) and BH3M (140 NTU), were above the DWC value (50 NTU).

It was noted that the laboratory limits of reporting (LORs) for mercury (Hg) and uranium (U) were higher than the discharge water quality criteria (see **Table B1**). These two metals should be retested at lower LORs to confirm that concentrations are below the respective water quality criteria. This will be undertaken as part of the pre-dewatering GME described in **Section 5.3**.

3.4.8 Water Treatment Requirements

Treatment during Construction Phase Dewatering

The baseline groundwater quality data indicates water treatment is required prior to stormwater discharge in relation to:

- The metals: aluminium, cadmium, nickel, zinc, cobalt and manganese;
- Nutrients parameters: Total Nitrogen and Total Phosphorus;
- Petroleum Hydrocarbons (TRH);
- pH; and
- Turbidity.

Potential water treatment options include pumping the water through a sediment settlement tank, where the following could also be implemented:

- Addition of flocculent/coagulant for settlement of suspended particles, which would lower the turbidity;
- pH correction implemented concurrently to higher water pH to the required range; and
- Adjustment of the flow rate to allow sufficient residence time for flocculation/coagulation and settlement to take place; and
- Adsorption filters using media such as Granular Activated Carbon (GAC) to treat TRH.

A water treatment specialist is to be engaged well in advance of project commencement to allow sufficient time for the design and mobilisation of the water treatment system, prior to the start of dewatering.

After the water treatment system is in place, testing of treated water quality is required prior to discharge to confirm that water treatment procedures are effectively achieving compliant discharge water quality. Further details on water quality monitoring and management are provided in **Sections 5.3** and **5.4**. Additional information in regards to water treatment system design and maintenance are provided in **Section 5.5**.

Treatment during Operational Phase Dewatering

The water quality data set at the conclusion of the construction dewatering phase will be used to inform water treatment requirements, to ensure compliant discharge waters for operational stormwater discharge, as described in **Section 7.3**.

4. DEWATERING METHODOLOGY

4.1 Excavation and Shoring

As stated in **Section 1.2**, the proposed development will include a six-level basement, with an estimated BEL of RL 71.5m AHD, and locally deeper excavations for footings, service trenches, crane pads and lift overrun pits.

Based on the GSA (**Appendix D**) and the information provided by the client, bulk (basement) excavation will be designed and supported by an anchored, fully permeable soldier pile wall with reinforced shotcrete infill panels, which is considered to be a drained basement.

The GSA is a hydrogeological model and did not assess the overall stability and embedment depth of the shoring system. A separate model assessing the stability of the shoring system may be completed by the geotechnical engineer if required.

4.2 Estimated Groundwater Take Volume

As described in the GSA report, groundwater seepage analysis was undertaken using the software package PLAXIS 2D (Version 2024.2.0.1144). PLAXIS 2D is a finite element software package, which is appropriate for non-complex sites with laterally uniform subsurface conditions. The model estimates the seepage rate of water entering the excavation through and beneath the shoring wall; therefore, providing a predicted water take during basement construction dewatering..

As the basement will be designed as a draining structure for this project, groundwater mounding was not a consideration for modelling purposes.

Based on a specific set of assumptions and field test data, which included determination of the design groundwater level at RL 87.6 m AHD (**Section 3.3**), as well as the onsite, layer-specific hydraulic conductivities (as detailed in the GSA report), groundwater seepage flow draining through and beneath the shored walls into the excavation during basement construction is predicted to be **7.0 ML** over a projected 365 days of construction dewatering (i.e. 30.41 m^3/ day).

It is noted that in accordance with the NSW *Water Management (General) Regulation 2018*, a Water Access Licence is required where the estimated groundwater take is more than 3 ML/year in the absence of any relevant exemption. Based on the modelled seepage volume, a Water Access License will be required for the construction and operational phases of the development.

4.3 Dewatering Level, Drawdown-Induced Ground Settlement and Monitoring

With freely draining groundwater seepage flow, the groundwater drawdown surrounding the basement boundary is predicted to be approximately 7.6 m at the basement perimeter shoring walls, with an estimated maximum radius of influence (cone of depression extent) in relation to drawdown effects of 20 m from the shoring wall.

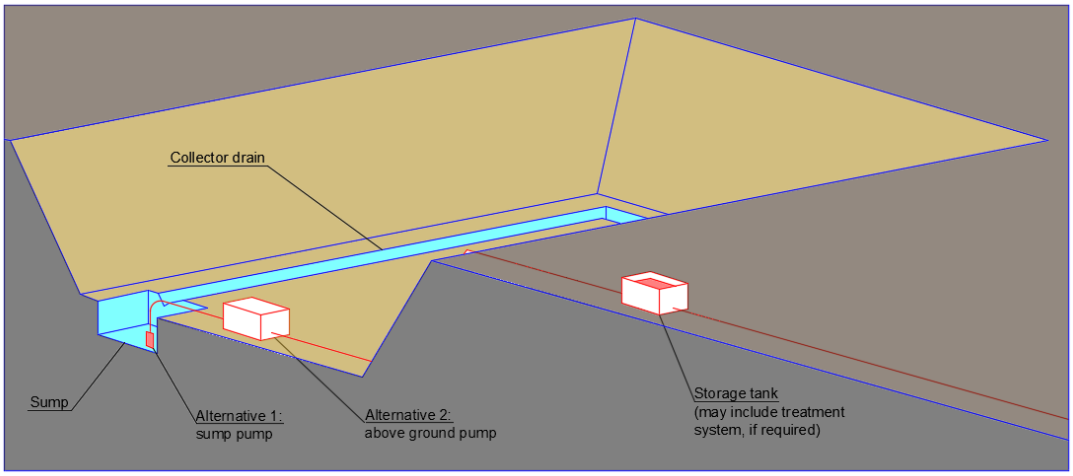
With reference to the GSA report, the ground outside the shoring wall is expected to experience ground settlement within the range of 5.2 mm. Less than 5.0 mm of settlement is considered to pose a 'negligible' risk in terms of the category of damage risk due to dewatering, as defined by Cashman and Preene (2021).

Groundwater elevations will be monitored periodically during the construction dewatering period by measuring groundwater depth in selected monitoring wells. Groundwater depth monitoring may be adequately gauged manually by electric water contact meter during each dewatering monitoring event, as described in **Section 5.4**.

4.4 Dewatering Method

Dewatering of lower yielding aquifers (e.g. fractured bedrock) may involve a sump and pump system to control water seepage into the excavation during basement construction, as illustrated in **Figure 4-1**.

Figure 4-1 Hypothetical layout of a *Sump and Pump* seepage collection system



4.4.1 Construction Phase Dewatering

During construction, seepage water is to be collected and appropriately treated prior to discharge to the stormwater system. A collection sump is typically located at the lowest part of the excavation, from which collected seepage waters are pumped into a storage tank for sediment settling. The preferred tank type will require capacity to accommodate the predicted rate of groundwater seepage inflows during basement construction, which was modelled at 30.41 m^3/day (**Section 4.2**).

Groundwater treatment will be undertaken either in the settling tank, or via a water treatment system installed close to the tank prior to discharge. The treated water will then be discharged into the municipal storm water pit provided that prior approval for discharge has been obtained from the relevant consent authority.

The pumping system may operate on a full time or intermittent basis (as required), for the approved construction dewatering period.

The Site Manager, Dewatering Contractor and Water Treatment Specialist must agree on a dewatering strategy and appropriate position of the dewatering treatment system and water retention tanks, prior to the commencement of the excavation works.

4.4.2 Operational Phase Dewatering

A drained basement has been proposed for the operational (post-construction) phase of the development. This would involve collection of groundwater seepage via onsite detention storage (OSD tank, or equivalent), with discharge to the municipal stormwater system for the operational life of the project, with consent authority approval.

It is understood that Department of Climate Change, Energy, Environment and Water (DCCEEW)may consider an application for long-term, operational phase dewatering, where minimal impact considerations under the NSW Aquifer Interference Policy (AIP) are satisfied. An assessment against the AIP was undertaken, which found minimal impact requirements would be satisfied, as described in **Section 7**.

4.5 Discharge Flow and Volume Monitoring

The volume of water discharged must be monitored by a calibrated flow meter (or equivalent alternative means) that is integrated as part of the dewatering system for the complete duration of the temporary construction dewatering period. The flow meter will therefore display cumulative volume discharged at any stage during dewatering, which will be documented as part of the dewatering monitoring records.

In regards to the drainage and disposal of seepage waters entering the basement, the Client must provide details for the proposed disposal connection to the stormwater system, preferably in the form of drawings, suitable for Council review purposes.

Flow monitoring data will be documented by a suitably trained site employee under the supervision of the Site Manager. Tabulated records should be maintained on site and made available to the Environmental Consultant for inclusion in the routine monitoring event reports.

These records will be used to calculate the actual groundwater volume taken from the site and will be included in the Construction Dewatering Completion Report (**Section 5.4.3**), to be issued to Council and DCCEEW after the completion of construction dewatering activities.

For the construction phase, water level and volume monitoring will be conducted during the same monitoring events described in **Section 5.4**. For the operation phase, these monitoring events will be conducted annually, as described in **Section 7.3**.

4.6 Potential Drawdown-Induced Impacts

A review of potential adverse effects of dewatering on neighbouring properties and groundwater dependent ecosystems was undertaken, as summarised in **Table 4-1**.

Table 4-1 Assessment of Potential Dewatering Effects

Attribute	Description
Water supply losses by neighbouring groundwater users	As described in **Section 2.4** a review of registered bores within a 500 m radius of the site indicated no active water supply bores in the locality, indicating that local groundwater was not being utilised or relied on as a water supply source. The lack of utilisation of groundwater indicated that water supply losses are unlikely to be experienced as there are no identified local groundwater users..
Potential impacts on groundwater quality resulting from contaminant migration	Any onsite contamination sources will be removed during basement excavation, and contaminant migration towards the basement from potential offsite sources (e.g. the TLC Dry Cleaners as described in **Section 2.5**), is unlikely due to the distance (300 m) and down-gradient location of the dry cleaners in relation to the site. Further to this, the baseline groundwater quality data did not indicate any adverse impacts in relation to dry cleaning chemicals. The risk of lowering of the beneficial use category for the groundwater source (due to groundwater quality impacts at a distance of more than 40m from the dewatering activity), was deemed to be low due to the fact that groundwater is not utilised for water supply purposes in the areas surrounding the site.
Proximity of Groundwater Dependent Ecosystems (GDEs)	As described in **Section 2.7**, a search of Schedule 4 in NSW Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023, found no listed groundwater dependent ecosystems within 40 m of the site.
Potential subsidence of neighbouring structures	Drawdown-induced ground settlement for the proposed development is predicted to be 5.2 mm due to the maximum drawdown of 7.7 m. Ground

Attribute	Description
	settlements less than 5.0 mm are considered to be a 'Negligible' risk in regards to category of damage risk due to dewatering, as defined in Cashman and Preene (2021). This finding is consistent with the fact that the dewatered lithology comprises competent bedrock. Notwithstanding, it would be prudent for pre-dewatering and post-dewatering dilapidation survey reports to be completed by a suitably qualified geotechnical engineer before the start of the construction works and following the completion of construction.
Mounding of water up gradient of structure	As the basement will be designed as a draining structure for this project, groundwater mounding is not a consideration.

5. WATER QUALITY MANAGEMENT

5.1 Responsibility

The Principal Contractor or Site Manager, appointed for the construction works, will be responsible for implementing the water quality management procedures described in this report. Post-construction (i.e. occupational phase) water quality management, including water treatment and water quality monitoring will be overseen by strata management (see also **Section 7.3**).

5.2 Discharge Water Quality Guidelines

In accordance with statutory requirements for site dewatering operations, discharged waters must comply with the ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, or relevant default criteria where the ANZG (2018) guidelines do not provide values. This requirement is in compliance with the *Protection of the Environment Operations Act 1997*.

The nearest water body receptor is Swaines Creek, which is understood to be a fresh water body as described in **Section 2.5**. The ANZG (2018) *95% Freshwater Default Guideline Values* (*DGVs)* and 99% *DGVs* for bio-accumulative toxicants were therefore adopted as the Discharge Water Criteria (DWC). These will be the trigger levels for contingent actions (see **Section 6.5**) to ensure that only higher quality acceptable water quality is discharged to the environment.

For water quality parameters that are not currently addressed by the ANZG marine DGVs, relevant alternative criteria have been adopted as the default DWC, as detailed in **Table 5-1**. The listed parameters and their respective criteria are applicable for the assessment of water quality to confirm suitability for discharge to the storm water system.

The listed parameters and corresponding criteria will apply for both the initial (pre-dewatering) and on-going assessment of water quality of water being discharged to the storm water system during the construction and occupational phases of the development. It is noted however, that the testing of specific analytical parameters are not mandatory after the baseline groundwater quality assessment, in accordance with the *Routine water quality monitoring lists* in Appendix A of DPE (2022).

Table 5-1 Discharge Water Criteria (DWC)

Analyte	DWC (µg/L) [1]
Metals	
Aluminium (for waters with pH > 6.5) (Al)	55
Antimony (Sb)	9 [3]
Arsenic ^{III} (As III)	24
Arsenic ^{V} (As V)	13
Barium (Ba)	No Relevant Criteria
Beryllium (Be)	No Relevant Criteria
Boron (B)	940
Cadmium (Cd)	0.06
Chromium ^{III} (Cr III)	3.3 [3]
Chromium ^{VI} (Cr VI)	1

Analyte	DWC (µg/L) [1]
Cobalt (Co)	1.4 [3]
Copper (Cu)	14 [2]
Iron (Fe)	No Relevant Criteria
Lead (Pb)	3.4
Lithium (Li)	No Relevant Criteria
Manganese (Mn)	1900
Mercury (total) (Hg)	0.06
Molybdenum (Mo)	34 [3]
Nickel (Ni)	11
Selenium (Se)	11
Silica (dissolved SiO_2)	No Relevant Criteria
Silver (Ag)	0.05
Strontium (Sr)	No Relevant Criteria
Uranium (U)	0.5 [3]
Vanadium (V)	6 [3]
Zinc (Zn)	80 [2]
Petroleum Hydrocarbons / Total Recoverable Hydrocarbons (TRH)	
Oil and grease	*No visible sheens, surface films or oil and grease* [4]
Volatile TRH ($C_6 – C_9$)	No Relevant Criteria
Semi-volatile to heavy TRH ($C_{10} – C_{40}$)	No Relevant Criteria
Monocyclic Aromatic Hydrocarbons (BTEX)	
Benzene	950
Toluene	180
Ethylbenzene	80
o - xylene	350
p - xylene	200
m - xylene	75
Polycyclic Aromatic Hydrocarbons (PAH)	
Benzo(a)pyrene	0.1
Naphthalene	16
Microbiological Organisms	
Faecal coliforms, Faecal streptococci, Escherichia coli (E. coli)	No Relevant Criteria
Major Ions	
Anions: sulfate, chloride, carbonates, bromide, fluoride	No Relevant Criteria

Analyte	DWC (µg/L) [1]
Cations: calcium, magnesium, sodium, potassium	No Relevant Criteria
Ionic balance: cation / anion balance (as a percentage)	No Relevant Criteria
Nutrients	
Ammonia	900
Nitrate (NO_3)	700 [7]
Nitrite (NO_2)	No Relevant Criteria
Total Oxidised Nitrogen (NO_x)	40 [9]
Total Nitrogen	500 [9]
Total Phosphorus	50 [9]
Reactive Phosphorus	20 [9]
Other	
Total Cyanide	7
Phenol	320
PFOS	0.13 [8]
PFOA	220 [8]
Physiochemical Parameters	
EC (µS/cm)	2,200 [6]
pH (pH units)	6.5 to 8.0 [5]
Turbidity (NTU)	50 [6]

Note 1 Discharge water criteria are the ANZG (2018) *95% Default Guideline Values (DGVs)* for the protection of slightly to moderately disturbed freshwater ecosystems, with the *99% DGVs* applied for the bio-accumulative parameters *benzo(a)pyrene*, *cadmium* and *mercury*, unless otherwise indicated.

Note 2 For the metals copper and zinc, which are commonly present as regional background components in groundwater at concentrations above the ANZG 2018 95% Fresh DGVs, discharge water criteria are set at one order of magnitude higher than the ANZG 2018 DGV.

Note 3 The ANZG (2018) only provides freshwater criteria at an 'unknown' level (%) of species protection for *antimony, chromium III, cobalt, molybdenum, uranium* and *vanadium*; therefore, these DGVs are applied.

Note 4 NHMRC (2008) No Detectable Oil & Grease - OG test must find no visible film or sheen at the water surface and no detectable hydrocarbon odours, based on aesthetic aspects, as described in NHMRC (2008) *Guidelines for managing risks in recreational water*, Section 10.2.2.

Note 5 In the absence of ANZG (2018) criteria, alternative pH criteria from ANZECC / ARMCANZ (2000), Table 3.3.2 *Default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems* were used. The adopted pH range for *Lowland River* settings is applied.

Note 6 In the absence of ANZG (2018) criteria in relation to *Turbidity* and *water salinity* (as indicated by EC), the ANZECC & ARMCANZ (2000), Table 3.3.3 *upper default trigger values for Lowland River settings* are applied.

Note 7 In the absence of ANZG (2018) criteria in relation to *Nitrate*, the ANZECC & ARMCANZ 2000, *95% Freshwater Trigger value (Ref. Table 3.4.1 Trigger values for toxicants at alternative levels of protection)* is applied.

Note 8 DWC value is derived from the National Environmental Management Plan for PFAS (2020) - *95% species protection for slightly to moderately disturbed systems*.

Note 9 In the absence of ANZG (2018) criteria, alternative criteria from ANZECC / ARMCANZ (2000), Table 3.3.2, *Default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, Lowland River* criteria were adopted for total oxidised nitrogen (NO_x), total phosphorus (TP), reactive phosphorus (FRP) and total nitrogen (TN).

5.3 Additional Pre-dewatering Monitoring Event

The baseline groundwater quality assessment included all mandatory parameters listed in Appendix A of DPE 2022 (as detailed in **Section 3.4.5**); however, an additional pre-dewatering GME is warranted to close the following data gap:

- Testing of dissolved mercury (Hg) and uranium (U) at lower laboratory LORs to confirm that concentrations are below the corresponding discharge water quality criteria.

5.4 Discharge Water Quality Monitoring

5.4.1 Visual and Odour Monitoring

Visual inspections of the dewatering measures and equipment should occur regularly (daily where possible) by the Site Manager and/or Dewatering Contractor, to ensure:

- The effective operation of all dewatering treatment equipment, including inspection that short-circuiting of water around baffles and filter media is not occurring within sediment retention tanks;
- No petrochemical sheens are visible on the water surface and no hydrocarbon odours are being generated by the treated groundwater or sediment; and
- No green, blue or extremely clear effluent, potentially indicating high levels of dissolved aluminium (if used in the treatment process).

The Site Manager must keep a record of all visual observations and operational measurements such as flow rates and water flow meter readings (if used), as detailed in **Section 5.6**.

5.4.2 Sample Collection and Analysis

On-going sample analysis must continue for the duration of construction dewatering activities, to establish that the treatment system (if required) is functioning as intended, and to confirm the quality of discharge water is acceptable for release into receiving water bodies (Swaines Creek).

Sample collection should be completed by a suitably qualified environmental scientist or equivalent, with the subsequent analyses performed by a reputable environmental laboratory using NATA-registered analytical methods. The analytical program is to include the parameters listed in **Table 5-1** (**Section 5.2**) and/or the parameters in accordance with *Appendix A – Routine water quality monitoring lists* (DPE, 2022). Certain parameters may be removed from the testing suite, subject to laboratory analytical results, as advised by the appointed water quality specialist / environmental consultant.

The following activities are to be implemented for the on-going monitoring program:

Trial-Run Period

- Prior to the discharge of any extracted groundwater, a trial run will be completed as follows:
  - Initial groundwater pumped from the site will be diverted into the excavation, until a reduction in suspended sediments is observed, which are expected in the initial pump-out waters;
  - Samples of the treated groundwater will be collected and laboratory analysed for the DPE 2022 mandatory water quality parameters; and
  - After confirmation that the water quality complies with criteria, the extracted groundwater will be directed to the municipal storm water system, using the Council-approved connection point.
- As a minimum, two samples of treated groundwater will be collected for each of two weeks during the designated trial-run period. The analytical results will be compared to each other, as well as to the DWC, to assess the performance of the water treatment system. The

results of each sampling event will be recorded, to establish chemical concentration trends (if any).

- Bi-weekly sampling should be maintained for a minimum of two weeks following commencement of the dewatering treatment, unless stated otherwise by the Environmental Consultant. Sampling for trial run purposes will cease once the target parameters in treated water stabilise (i.e. consecutive tests are within ± 10% of the observed results) and contaminant concentrations are within the adopted discharge criteria for three consecutive sampling events. The trial-run period may be extended if stabilisation is not observed, or if the treated water does not satisfy the adopted criteria (**Table 5-1**).
- The Dewatering Contractor / Water Treatment Specialist should seek advice from the Environmental Consultant regarding termination of the trial-run period.
- During the trial-run period, all collected groundwater seepage (including treated water) should be retained on-site and stored in appropriate bulk containers. No collected groundwater should be discharged until it is proven to meet the adopted criteria.

Construction Phase - Monitoring Frequency (Weekly, Fortnightly and Monthly)

- After the Trial-Run Period, and subject to statutory authority approval, treated water may be discharged to the storm water system. A weekly sampling frequency will be adopted for four weeks. The sampling program will involve the collection of one system discharge (i.e. treated) sample (as a minimum), to be analysed for the target parameters of concern, to confirm the system is functioning as intended.
- After four weeks, the weekly sampling frequency may be extended to fortnightly monitoring for one month and then monthly for the remaining duration of construction phase dewatering, provided the analytical monitoring results indicate the treated water quality consistently meets the adopted criteria. If this is not achieved, contingency measures must be implemented, with monitoring frequency going back to weekly until consistency in the discharged water results is re-established.

Operational Phase - Monitoring Frequency (Annual)

- Provided that the Discharge Monitoring Period shows consistent and compliant results, the monitoring frequency can be extended to annually during the operational period, until the end of year 3, as described in **Section 7.3**.
- As per the construction phase monitoring, contingency measures detailed in **Section 6.5** should be implemented if groundwater results exceed or are predicted to exceed the adopted criteria for any one monitoring event, based on trending water quality results.
- Any changes to the sampling frequency are to be determined by the appointed environmental consultant, and justification must be documented in the monitoring records.
- **Note:** All laboratory analytical results for the water samples must be retained, to be made available upon request by Council, DCCEEW.

5.4.3 Reporting of Water Quality Results

Dewatering management procedures and monitoring results will be reviewed by the appointed Environmental Consultant to ensure that the treatment procedures are effective, and that the discharge waters are in compliance with the adopted DWC (**Table 5-1**). Discharge water quality reporting will be required as follows:

- **Interim Monitoring Reports** will be prepared and issued to the Site Manager (during the construction phase), upon receipt of laboratory data for each round of water quality monitoring for the discharged waters. The interim reports will detail the sampling methods and procedures, provide a comparison between historical and current results, assess the results against the adopted criteria and provide recommendations on corrective actions, when required.

- **Interim Dewatering Completion Report** - Following completion of construction dewatering activities, an *Interim Dewatering Completion Report* will be prepared by the appointed Environmental Consultant, as described in **Section 5.6.1.** The interim report will report on construction phase dewatering and must include copies of all analytical results and monitoring reports issued during the construction phase dewatering period. The report will be submitted to Council and DCCEEW.
- **Annual Dewatering Monitoring Reports** will be prepared as described in **Section 5.6.2**, upon receipt of laboratory data for each annual round of water quality monitoring during the operational phase of the development, as described in **Section 7.3**.

5.5 Water Treatment

5.5.1 Treatment System Design

Baseline groundwater quality data to date (**Section 3.4**) indicates that treatment of seeped groundwater will be necessary in relation to dissolved metals (aluminium, cadmium, nickel, zinc, cobalt and manganese), petroleum hydrocarbons, pH, turbidity and nutrients parameters: total nutrients and total phosphorus prior to discharge to the storm water system. Subject to the findings of the additional pre-dewatering GME in relation to Hg and U, as described above, additional water treatment for these parameters may also be necessary should exceedances of the DWC be confirmed.

It is recommended that the selection and design of the preferred treatment system are managed by a Dewatering Contractor / Water Treatment Specialist, in collaboration with the appointed Environmental Consultant. Alternative and/or additional water treatment options may be required, depending on which parameters are found to exceed the DWC after the additional, pre-dewatering monitoring event described in **Section 5.3**.

The design and installation of the preferred system should consider:

- A treatment tank with minimum capacity capable of containing the expected inflow for the basement (as described in **Section 4.4.1**);
- Water filtration to reduce coarse and fine suspended solids;
- If applicable, automated in-line chemical dosing systems for the addition of coagulants for the adjustment of turbidity and other parameters, which may be required as described in **Section 6.5** *Dewatering Contingencies*;
- Groundwater treatment to reduce concentrations of contaminants exceeding the DWC to below the values presented in **Table 5-1**;
- Spare retention tank(s) to provide additional residence time and sedimentation, in the case that non-compliant water quality is identified during routine monitoring, triggering temporary redirection and storage while adjustments to the water treatment system are being implemented; and
- A means of monitoring flow rate to enable the accurate determination of total discharge volume.

The above information is provided for guidance purposes. A water treatment specialist should be engaged to advise on appropriate technologies for the treatment of all parameters.

The water treatment system should be installed, tested and operational prior to the commencement of dewatering, to ensure that only treated water meeting the adopted quality criteria is discharged from the site.

5.5.2 Treatment System Maintenance

The groundwater treatment system(s) must be regularly maintained by the Dewatering Contractor / Water Treatment Specialist. Maintenance must include (if applicable):

- Regular cleaning and or replacement of the geo-fabric / particle filters within the retention tanks;
- Media changeover (e.g. granular activated carbon) whenever breakthrough conditions are met; and
- Regular removal of sediment from the retention tanks by an appropriately-licensed waste contractor.

5.6 Reporting of Dewatering Information

5.6.1 Interim Report - Construction Dewatering

For all State Significant Developments (SSDs) all dewatering matters are handled by DCCEEW. So the required forms are to be obtained directly from the department.

A *completion report* will be prepared and submitted to DCCEEW, at the completion of site dewatering. The completion report must accompany an application to DCCEEW to surrender the *water supply work approval* at the time that site dewatering is ended.

As the proposed dewatering will involve operational dewatering, the first report to be submitted to DCCEEW for this site will be titled "*Interim Report – Construction Dewatering"* and will document all records collected from the beginning to the end of the construction dewatering period.

The routine logging of flow meter readings at the start and finish of each dewatering event is to be completed by a responsible representative of the construction team (e.g. the Site Manager). Each flow meter entry will record a volume of water take associated with it, to enable the calculation of cumulative water take volume at any time during the site dewatering period.

Other records including water quality results, laboratory analytical reports and groundwater level monitoring records may be supplied by the appointed specialist contractors/consultants to the responsible person, who will compile and attach the relevant information to the Interim Report form. The Site Manager may authorise a qualified contractor/consultant to maintain the Interim Report on the Site Manager's behalf.

At the completion of the construction phase, the Interim Report will be submitted to DCCEEW for review.

5.6.2 Annual Reporting for Operational Dewatering

As site dewatering will continue during the occupational phase of the development, monitoring will continue under the responsibility of Strata Management through the occupational phase. This will require the same information as required for the *Interim Report* (described in **Section 5.6.1**), to be logged and submitted to DCCEEW on an annual basis under the report title "*Annual Report – Occupational Dewatering"*.

Monitoring frequencies for the occupational phase are detailed in **Section 7.3**.

All laboratory analytical results, flow meter logs and groundwater level monitoring records must be maintained by strata management, and should be made available upon request by Council, and DCCEEW.

5.6.3 Dewatering Completion Report

A final *"Dewatering Completion Report"* will be submitted to DCCEEWat the termination of site dewatering, together with an application to surrender the construction water supply works approval (a copy of this form is also provided in **Appendix I**). The *"Dewatering Completion Report"* will also be used to submit a new water supply works approval for the operational phase of the building.

6. SITE MANAGEMENT AND CONTROLS

6.1 Deviations from this Plan

The Site Manager should seek advice from the Environmental Consultant if deviation from the agreed monitoring program is considered. To ensure the monitoring data set and the early warning objectives of the DMP are not compromised, variations will only be considered where technical justification exists, and any deviations that may be accepted will be documented within the corresponding reports, and must include all justifications for the variation accepted.

Should deviations from the DWC be considered technically justifiable, approval from Council and DCCEEW must be obtained before alternative discharge criteria are applied.

6.2 Contact Details for Key Personnel

Once the relevant personnel have been appointed, their names and contact information must be clearly displayed on-site, within the site office. An example format is as follows:

Site Manager	Name: To be confirmed Company: To be confirmed	Mobile phone: To be confirmed Email: To be confirmed
Dewatering Contractor	Name: To be confirmed Company: To be confirmed	Mobile phone: To be confirmed Email: To be confirmed
Water Treatment Specialist	Name: To be confirmed Company: To be confirmed	Mobile phone: To be confirmed Email: To be confirmed
Environmental Consultant (Water Quality Expert)	Name: To be confirmed Company: To be confirmed	Mobile phone: To be confirmed Email: To be confirmed

6.3 Summary of Specific Activities

The appointed contractors and/or Site Manager will be responsible for ensuring that the following activities (requirements) are undertaken during the dewatering program:

- Maintain erosion and sediment control measures in a functioning condition, until all earthwork activities are completed.
- Perform daily inspection of the recharge well(s), stormwater diversions and sediment / erosion control devices, ensuring it is operating effectively and at full capacity.
- Implement appropriate remedial measures where any controls or devices are not functioning effectively or are inappropriate.
- Collate records and comments on the condition of existing erosion and run-off controls (drains, silt fences, catch drains etc.), dewatering procedures and test results, and any site instructions issued to sub-contractors to undertake remedial works.
- Maintain rainfall data (to be filed on site).
- Confirm water quality parameters meet the relevant discharge limits, by disclosing supporting documentation upon request.
- Reporting any incidents of poor drainage or uncontrolled discharge.
- Recording all daily inspection reports, environmental incidents and controlled discharge volumes, which may be reviewed during any environmental audit performed on the site.

6.4 Vibration, Noise, and Odour Management

- It is the responsibility of the Site Manager to ensure appropriate management of vibration, noise and odour during dewatering operations. A noise and vibration assessment for the State Significant Development Application (SSDA) has been prepared for the proposed development and is included in **Appendix J**.

6.5 Dewatering Contingencies

Contingent actions for scenarios that may arise during dewatering are detailed in **Table 6-1**.

Table 6-1 Mitigation Measures for Potential Dewatering Issues

Anticipated Problems	Preventive / Corrective Actions
Water Quality Criteria Non-compliance	
Water Quality Criteria Exceedance Laboratory analytical report for any monitoring event reveals that the quality of treated discharge water does not satisfy the Water Quality Trigger Values detailed in **Table 5-1**.	Immediate action must be taken to halt the release of water into receiving water bodies, where water quality is found not to meet the adopted criteria detailed in **Table 5-1** Discharge of water must be suspended to enable the following procedure to be implemented: 1) Water will be redirected to storage retention basin/tanks; 2) A water sample will then be collected and sent to the laboratory for confirmation analysis for the non-compliant parameter(s) on an express (24hr) results turn-around basis; 3) Should the analytical result for the confirmation sample show that the previously non-compliant parameter(s) is/are now meet the adopted criteria, the treated water outlet may be redirected to receiving water bodies; however 4) Should the analytical result for the confirmation sample show that the discharge water quality does not comply with the adopted criteria, the environmental consultant / water treatment specialist will be required to modify the water treatment system, in order to achieve compliant discharge water quality. Collection of further treated water samples will be required to confirm the effectiveness of the modifications; 5) After laboratory confirmation that the revised treated water quality complies with criteria, extracted groundwater may be redirected to receiving water bodies; and 6) Weekly monitoring of treated discharge water quality monitoring will be required, until such time that contaminant concentrations are within the adopted criteria values for three consecutive sampling events. Once this is achieved, fortnightly monitoring may be reinstated. **Note: Wastewater Removal** - It may be necessary to have collected waters removed by a licensed wastewater contractor, should quantities exceed the on-site capacity for temporary storage. In this case, records must be maintained to document quantities of wastewater disposed in this way, with provision of wastewater disposal dockets issued by the contractor to be retained for audit and reporting purposes.
Visible and Olfactory Impacts Visual and/or olfactory anomalies (e.g. change in water colour, turbidity, odour, presence of oil / grease) are observed in extracted groundwater.	Similar to the above procedure (Steps 1 to 6) treated water will be redirected to an alternative retention vessel, while the treatment system is adjusted. It may be necessary to have collected waters removed by a licensed wastewater contractor, should retained quantities exceed the on-site capacity for temporary storage. The contractor is to seek advice from a suitably experienced environmental consultant in regard to the additional assessment and treatment that may be required for any observed changes to water appearance or detectable odours.

Anticipated Problems	Preventive / Corrective Actions
Repeated Criteria Exceedances After three non-compliances for discharge water quality.	Retain extracted water onsite in appropriate bulk containers for subsequent removal by a licensed wastewater contractor. Determine an alternative discharge method, if necessary, updating this report accordingly.
Groundwater Take Non-compliance	
Excessive Extraction The predicted daily inflow rate (specified in **Section 4.2**) is exceeded.	Advise the appointed environmental consultant who will review the reasons for the increased dewatering rate. If reduction in dewatering rate cannot be implemented, DCCEEW should be contacted to review options, which may include a combination of: ▪ Temporary retention of tail water onsite in appropriate bulk containers for subsequent removal by a licensed waste contractor; ▪ Aquifer re-injection after obtaining regulatory approval; and/or ▪ Fast-tracking of construction works to complete dewatering sooner than the scheduled timeframe.
Drawdown-Induced Ground Settlement Risk	
Excessive Water Level Drawdown	As documented in the GSA report (**Appendix D**), dewatering will have adverse impact on the neighbouring properties. Should groundwater level monitoring during site dewatering reveal greater than predicted drawdown levels at the site boundary: 1) The client, geotechnical engineer, structural engineer and relevant stakeholders (including potentially affected neighbouring property owner(s)), should be notified; and 2) Revisions to the dewatering approach for deeper works (e.g. localised pumping around lift pits and other deeper construction features), should be defined and implemented, thus limiting the lateral extent of deeper dewatering.
System Performance Issues	
Dewatering System Failures	Ensure that spare equipment (where practical) is on hand. Ensure that the failed equipment can be serviced by site personnel or an appointed contractor who can rapidly report to site when needed.
Power Outages	Ensure that a backup generator is readily available. In this event, an assessment across the site and surrounding sites should also be completed in order to identify whether any other lights and electrical equipment are working so to identify if the issue is site specific or if it is across a whole area. In addition to having the back-up generator running, the contractor should also seek advice from an electrician in regard to the additional assessment and repairs that may be required.
Unexpected contaminants found during monitoring	Contact the appointed environmental consultant / water quality expert and collect samples for analysis, to assess the identified concentrations against relevant criteria. If the contaminant is found to exceed the adopted criteria, follow the corrective actions corresponding to *Water Quality Criteria Exceedance* above. Expand the adopted criteria accordingly.
Chemical/fuel spill and leaks from machinery	Stop earthworks, notify site manager. Use accessible soil or appropriate absorbent material to absorb the spill (if practicable). Stockpile the impacted material in a secure location, on builder's plastic to avoid cross contamination. Inspect groundwater and note any visual and/or changes. The contractor should seek advice from environmental consultant in regard to assessment and treatment requirements.
Excessive rainfall	Ensure sediment and surface water controls are in place and functioning as intended, as per the designs provided in the site-specific Soil and Water Management Plan which will be completed

Anticipated Problems	Preventive / Corrective Actions
	prior to the construction certificate. Any non-conformance is to be documented and rectified. The capacity of the dewatering system to dispose larger volumes of water should be evaluated and if required, a temporary system should be utilised following correspondence with Council / DCCEEW and the environmental consultant.
Excessive noise	Identify the source and isolate if possible. Modify the actions of the source or erect temporary noise barriers if required.
Impacts on the stability of adjacent structures	Contractor to seek advice from qualified professional (such as a geotechnical engineer and/or structural consultant) in regards to the additional assessment and monitoring that may be required.
Excessive organic odours / vapours	In accordance with Council's Contaminated Land Policy, no nuisance odours are to be detected at any site boundary during the dewatering stage. Should odour emissions be detected at a site boundary, the following measures will be implemented: 1) Stop work, to allow odour to subside. 2) Monitor ambient air across the site and boundaries with a portable photo-ionisation detector (PID). 3) Implement control measures, including respirators for on-site workers, use of odour suppressants and wetting down of excavated material. 4) Notify the occupants of adjoining premises regarding odour issues. Notification should be in writing, providing the contact details of the responsible site personnel. 5) Record logs for odours and volatile emissions using photo-ionisation detectors (PID), if applicable.
Complaint management	Notify client, site manager and environmental consultant (if required) logging and following up complaint. Reporting should follow management procedures. Implement control measures to address reason of complaint (if possible) and notify complainant of outcome.

7. MINIMAL HARM ASSESSMENT

7.1 Consideration of NSW Aquifer Interference Policy

In accordance with the NSW Water Management Act 2000 the taking of water from an aquifer and/or the disposal of water taken from an aquifer is defined as an aquifer interference activity. The NSW 2012 Aquifer Interference Policy (the 'NSW AIP') provides guidance for the assessment of potential impacts of dewatering on water users and groundwater dependent ecosystems. The NSW AIP assessment process was performed with due regard for all hydrogeological information collected for the site and is presented below.

7.1.1 Hydrogeological Model Summary

With reference to the site-specific hydrogeological conceptual model (**Section 3.2**), for a bedrock aquifer with groundwater under pressure conditions, groundwater seepage would enter the excavation flowing through joints, faults and bedding plane fractures within the bedrock. Lower seepage flow volumes may be expected during depressed groundwater levels in dry periods, with higher seepage flow after high rainfall events, which would be expected to cause temporary, elevated groundwater levels.

7.1.2 Groundwater source category

Under the NSW 2012 Aquifer Interference Policy (the 'NSW AIP') *highly productive groundwater* is defined as a groundwater source that:

a) has total dissolved solids (TDS) of less than 1,500 mg/L; and

b) contains water supply works that can yield water at a rate greater than 5 L/sec.

Baseline groundwater salinity was shown to be above 1,500 mg/L TDS with EC values above 3,000 µS/cm and laboratory TDS values ranging from 1,800 mg/L and 2,200 mg/L (see **Table B2**). With reference to the GSA report, modelled inflow to the basement is predicted to be approximately 0.352 L/sec (i.e. 30.41 m^3/day).

The aquifer at the site therefore meets the description of a *"less productive groundwater source"*, as defined under Section 3.2.1 *Aquifer impact assessment* of the NSW AIP.

7.1.3 Minimal impact considerations

In accordance with the NSW AIP Table 1 *"If the predicted impacts are less than the Level 1 minimal impact considerations, then these impacts will be considered as acceptable."*

Table 1 *Minimal Impact Considerations for Aquifer Interference Activities* of the NSW AIP shows that for *Less Productive Groundwater Sources* in low yielding porous and fractured rock water sources that are under groundwater pressure conditions, the following minimal impact considerations are applicable:

Drawdown

- *Level 1 – A cumulative pressure head decline of not more than 2m, at any water supply work.*
- *Level 2 – If the predicted pressure head decline is greater than the Level 1 requirement (above), then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply.*

Water Quality

- *Level 1 - Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.*
- *Level 2 - If the Level 1 condition (above) is not met, then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works.*

7.1.4 Impact Assessment Conclusions

The proposed dewatering for the construction and operational phases of the project are considered to be compliant with the NSW AIP minimal impact criteria for the following reasons:

- While the estimated maximum cumulative pressure head decline (7.71m) has been modelled to be greater than *Level 1 minimal impact considerations* in regards to drawdown, there are no active water supply bores within 500m of the site; therefore water supply losses in response to dewatering are unlikely.
- As the drawdown will occur in competent bedrock with less than 5.0 mm of drawdown-induced ground settlement predicted immediately adjacent to the shoring wall, this is deemed to pose a 'negligible' risk in terms of the category of damage risk due to dewatering; therefore, no potential adverse impacts are likely on neighbouring properties.
- The TLC Dry Cleaners (located 300m down-hydraulic gradient of the site) represent a low risk of potential offsite sources of contaminants; however, as baseline groundwater quality data did not indicate any detection of typical dry cleaner contaminants and as groundwater is not utilised, dewatering would be unlikely to adversely impact the beneficial use category of the groundwater source and the *Level 1 Water Quality* conditions would be maintained.
- There is no documented, high priority, groundwater dependant ecosystem within 40 m of the site.

In addition to the above, the routine monitoring of treated water quality, groundwater drawdown and water take, as well as the dewatering contingencies tabulated in **Section 6.5**, are designed to ensure that potential impacts are minimised.

7.2 Assessment Inputs

The inputs for assessing the potential impacts of dewatering on the groundwater system are summarised in **Table 7-1**.

Table 7-1 Assessment inputs summary

Assessment Items	Comments
1. Estimated water take volume	As detailed in **Section 4.2**, the water take volume is estimated to be **7.0 ML** per year during the construction and operational phases of development.
2. Suitability of volume estimation	Use of PLAXIS 2D (a finite element computer model), implemented by experienced Geotechnical Engineer and reviewed by Senior Geotechnical Engineer (see also the GSA report in **Appendix D**).
3. Ground elevation across the site	Site elevations range from 90 metres mAHD at the northern boundary, to 92 mAHD towards the southern boundary. Based on observations during the site inspection, local topography slopes towards the north.
4. Geotechnical ground characterisation	Refer to GSA report in **Appendix D**.
5. Water level measurements	Groundwater levels were measured at depths from 80.53 m AHD

Assessment Items	Comments
	(minimum) to 86.54 m AHD (maximum), as detailed in **Section 3.3**. Periodic groundwater level gauging will be conducted on an annual basis (i.e. 1 monitoring event per year) at monitoring wells during the operational phase, as described in **Section 5.4.2**.
6. Required water level draw down and potential impacts	The GSA (EI, 2025c) determined that there will be a drawdown of approximately 7.6 m from the shoring wall as a result of the dewatering. The associated settlement of the groundwater drawdown was calculated to be 5.2 mm, which is considered to have a negligible impact on the neighbouring properties. This is due to the fact that the dewatered lithology comprises competent bedrock, and as such ground settlement impacts due to water level drawdown during temporary construction dewatering are unlikely to be significant.
7. Works proposed for dewatering	A drained basement using drainage of sub-soil seepage waters and a sump-and-pump system, as described in **Section 4.4**.
8. The base level of the aquifer	Fractured shale and sandstone bedrock extends below the proposed BEL, see **Section 3.2**.
9. Excavation footprint dimensions	Refer to basement plan included in **Appendix C**.
10. Hydraulic conductivity of lithological units	Detailed in Table 1 of the GSA report (EI, 2025e) in **Appendix D**.
11. Anticipated duration of dewatering	Dewatering will be ongoing for the approved construction dewatering period, while operational dewatering will be ongoing for the life of the project.
12. Depth of piling embedment beneath bulk excavation	Refer to **Section 4.1** – embedment depth will be provided with final design and detailed shoring plans.

7.3 Operational (Occupational) Phase Dewatering Management

7.3.1 Monitoring and Reporting

The following procedure will be adhered to by strata management to ensure that the long-term dewatering system is managed appropriately. It is noted that part of the extracted water during the operational phase is intended to be discharged directly to stormwater, with the remainder of the volume intended to be recycled and reused as irrigation for the landscaping.

- **Groundwater level monitoring**: Scheduled groundwater level monitoring is required for the first 36 months of the sump and pump operational phase in order to characterise seasonal groundwater level fluctuations for the operational (post-construction) phase of the development. It is noted that the occupational phase of the development commences prior to the sump and pump commences operation.

  A quarterly groundwater level monitoring frequency (i.e. once every 3 months) will be adopted for the first twelve months of occupation. This will be followed by semi-annual water level monitoring (i.e. once every 6 months) for the second year; then annual monitoring (i.e. a monitoring event at the end of the third year). Water level data will be recorded on a data form to document date of monitoring, well identification number, reference point from where all water level measurements are consistently taken (e.g. top of well casing, or ground level), the depth to water and the name of the person conducting the monitoring.

- **Discharge volume monitoring**: The volume of water discharged to stormwater must be monitored by a calibrated flow meter (or equivalent alternative means) that is integrated as part of the long-term pumping system. The flow meter (or flow monitoring device) will

display cumulative volume discharged, which will be recorded onto the same data form used to document groundwater level, at the time of each water level monitoring event. Discharge volume monitoring frequency will therefore be the same as for groundwater level monitoring, i.e. quarterly for the first year, every 6 months for year two, and a single monitoring event at the end of year three.

- **Water quality monitoring**: A single, post-treatment water sample will be collected on an annual basis during the final monitoring event in each year (i.e. at 12 months and 24 months of operation). Treated water samples will be laboratory analysed for the priority discharge water quality parameters (**Table 5-1**), to confirm that DWC compliance and show that discharge water quality is not deteriorating with time. Given that the groundwater is to be treated prior to offsite discharge, the risks presented to the human health and environment for the construction phase of the development are considered low and acceptable. Groundwater assessment of water quality parameters is required at the end of the construction phase to verify concentrations, and review or amend proposed operational phase water treatment if required.
- **Annual dewatering monitoring report**: A factual, 12-monthly Dewatering Monitoring Report will be prepared in letter format after each 12 months of monitoring by the appointed consultant. Each report will document the groundwater level gauging results, groundwater quality results and the cumulative volume of water discharge from the seepage collection sump to the storm water system. The monitoring report will also include an updated copy of the monitoring data form, showing all monitoring records since the start of the occupational phase. Each annual monitoring report will also include a trend analysis of the monitoring data and provide a discussion to characterise trends in groundwater quality, groundwater levels as measured in the monitoring well and water discharge volumes over time.
- **Cessation of monitoring**: Should the annual dewatering monitoring report after the 36th month of occupation confirm that groundwater quality, groundwater level fluctuations at the monitoring well(s) and annual groundwater discharge volumes are stable (i.e. not statistically trending up or down), then it will be determined that equilibrium has been reached and termination of the monitoring program would be justified. If this is not the case then the dewatering program will be reviewed accordingly. The appointed environmental consultant will provide notification to Council to document the termination or continuation of monitoring at this stage. Should monitoring be continued, a review of monitoring frequency will be undertaken and appropriate notification to Council will be issued by the appointed environmental consultant. EI note that DCCEEW is to be notified of the cessation of monitoring so that they can provide approval in writing for the deviation of the Water Supply Approval licence conditions.

7.3.2 Monitoring Well Replacement Protocol

At least one of the monitoring wells (and if practical, all) should be preserved to enable groundwater level monitoring close to and outside of the constructed basement. Should the existing wells be damaged during the construction works, installation of a new groundwater monitoring well must be installed as follows:

a) The replacement monitoring well must be appropriately located so as to avoid any damage or destruction during construction works;

b) Well design should be in accordance with the design for water monitoring bores for water level monitoring as specified under the *Minimum Construction Requirements for Water Bores in Australia* (Ref. NUDLC, 2020);

c) The well should be appropriately screened, with the water intake interval set across the lowermost basement level to monitor groundwater levels at the bulk excavation level, assuming uniform ground conditions; and

d) All reasonable steps must be taken to have the replacement bore installed within one week of the damage having occurred, subject to licensed driller availability.

8. DEWATERING MANAGEMENT SUMMARY

The requirements of this report are summarised in **Table 8-1**.

Table 8-1 Dewatering Management Summary

Item	Requirement / Procedure
Objective	Ensure that the proposed dewatering operations do not impact on the quality of the receiving surface waters (i.e. at the point of groundwater discharge). Where necessary, groundwater will be treated to achieve an acceptable water quality prior to discharge: ▪ *See **Section 3** for groundwater conditions.* ▪ *See **Section 5.2** for groundwater quality discharge requirements.* ▪ *See **Section 5.4** for groundwater treatment options.* Provide comment on groundwater level changes that occur during dewatering: ▪ *See **Section 4** for summary of groundwater take assessment and dewatering drawdown impacts.* *Refer to **Appendix D** for groundwater seepage analysis model.* Provide relevant information demonstrating that post-construction, operational dewatering would pose minimal harm to the groundwater source: *See **Section 7.3** for operational phase dewatering management.*
Person Responsible for Implementation of this Report	During basement excavation and construction, the Site Manager / Water Treatment Specialist will be responsible for ensuring the implementation of appropriate treatment of extracted groundwater, as outlined in this document. Occupation phase responsibility will rest with the Site Manager (yet to be determined).
Operation Dewatering Policy	To ensure that all extracted groundwater from dewatering is effectively treated prior to discharge to the receiving water bodies, as will be confirmed by the Operational Dewatering Management Procedure detailed in **Section 7.3**.
Pre-Dewatering Groundwater Assessment	As set out in **Section 3**, representative samples were collected prior to dewatering and tested for the identified potential contaminants, to provide baseline groundwater quality data and review the proposed discharge water quality requirements.
Geotechnical Monitoring Report	The geotechnical monitoring report, detailing 3 months of continuous groundwater level monitoring, is presented as an appendix in the GSA report in **Appendix D**.
Discharge Water Quality Criteria	All groundwater to be discharge into the local stormwater network is to meet (at the very least) the criteria outlined in **Table 5-1**, **Section 5.2**.
Implementation Strategy	All extracted groundwater will be monitored and treated (where necessary). On-going testing to be performed to confirm water quality meets the adopted Discharge Water Criteria (DWC) prior to release into the storm water network, which discharges to receiving water bodies. Additional treatment / wastewater disposal to be undertaken if the DWC values are not met.

Item	Requirement / Procedure
Monitoring Requirements for Construction Phase Dewatering	As specified in **Section 5.4**: ▪ 1. Initial Assessment = Prior to dewatering ▪ 2. Trial-Run Period = Twice per week* ▪ 3. Discharge Monitoring Period = Weekly for a month to fortnightly for a month then monthly* **provided the analytical results indicate treated water quality meets the adopted criteria, or risks are considered to be significantly low. Should analytical results exceed the adopted discharge criteria, contingencies listed in **Section 6.5** must be followed.*
Monitoring Requirements for Operational Phase Dewatering	As specified in **Section 7.3**: Quarterly for the first year, every 6 months for year two, and a single monitoring event at the end of year three.
Auditing	The appointed environmental consultant (water quality expert) will undertake weekly audits during the Trial-Run Period (if required), and monthly audits during the Monitoring Period, to ensure that all discharges comply with the criteria specified in **Section 5.2**.
Reporting	The contractor responsible for dewatering will keep records of all monitoring and laboratory test results, as well as quantities of treatment agents applied during the dewatering process. All records should be made available for inspection onsite during the construction phase.
Corrective Actions	As specified in the contingency measures, outlined in **Section 6.5**.

9. STATEMENT OF LIMITATIONS

This plan has been prepared for the exclusive use of Hyecorp Property Group Pty Ltd, whom is the only intended beneficiary of EI's work. The scope of work completed for the purpose of this plan is limited to that agreed with Hyecorp Property Group Pty Ltd.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in drafting similar plans by reputable members of the environmental industry in Australia, as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section must be read in conjunction with the whole of this plan, including its appendices.

EI's professional opinions are reasonable and based on its judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation or observations. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

Should you have any queries regarding this plan, please do not hesitate to contact EI.

10. REFERENCES

ANZECC/ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, October 2000.

ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Governments and Australian State and Territory Governments, Canberra ACT, Australia, August 2018.

Cashman and Preene (2001) *Groundwater Lowering in Construction*, *A Practical Guide* (Edition 1), New York: Spon Press.

Chapman GA and Murphy CL (1989) Soil Landscapes of the Sydney 1:100 000 Sheet, Soil Conservation Service of NSW, Sydney, September 1989.

DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*, NSW Department of Environment and Conservation, DEC 2007/144, June 2007.

DMR (1983) Sydney 1:100,000 Geological Series Sheet 9130, Geological Survey of New South Wales, Department of Mineral Resources.

DCCEEW (2023) *eSPADE v2.2 Portal*. NSW Department of Planning, Industry and Environment (retrieved from www.espade.environment.nsw.gov.au).

DPE (2022) *Minimum requirements for building site groundwater investigations and reporting*, NSW Dept. of Planning and Environment, Doc. PUB20/940, Rev. V02.2210, October 2022.

EI (2025a) *Preliminary Site Investigation; 37 Archer Street, Chatswood, NSW 2067*, Reference E26577.E01_Rev0, 30 April 2025 – the PSI report.

EI (2025b) *Preliminary Geotechnical Investigation; 37 Archer Street, Chatswood, Chatswood, NSW 2067*, Reference E26577.G03_Rev2, 23 May 2025.

EI (2025c) *Acid Sulfate Soil Management Plan; 37 Archer Street, Chatswood, NSW 2067*, Reference E26577.E14_Rev0, 30 April 2025.

EI (2025d) *Groundwater Level Monitoring Report No. 1, 37 Archer Street, Chatswood, Chatswood, NSW 2067,* Report Ref.. E26577.G11.GW01, dated 7 May 2025.

EI (2025e) *Groundwater Seepage Analysis, 37 Archer Street, Chatswood, Chatswood,* Report Ref. E26577.G12_Rev1 23 May 2025.

Murphy CL (1997) Acid Sulfate Soil Risk of the Prospect / Parramatta River Sheet (Second Edition), Department of Land and Water Conservation, Sydney, supplied by the Sydney South Coast, Geographical Information Systems Unit.

NEPC (2013) *National Environmental Protection (Assessment of Site Contamination) Amendment Measure*, National Environmental Protection Council, April, 2013.

NHMRC (2008) *Guidelines for Managing Risks in Recreational Water*, National Health and Medical Research Council, Australian Government, 2008.

NHMRC (2022) *Australian Drinking Water Guidelines, Paper 6 National Water Quality Management Strategy*, National Health and Medical Research Council, Commonwealth of Australia, Canberra, Version 3.8, September 2022.

NUDLC (2020) *Minimum Construction Requirements for Water Bores in Australia* (4th Edition), National Uniform Drillers Licensing Committee.

NSW EPA (2013) *Licencing Fact Sheet – Using Environment Protection Licensing to Control Water* Pollution, EPA 2013/0119, May 2013.

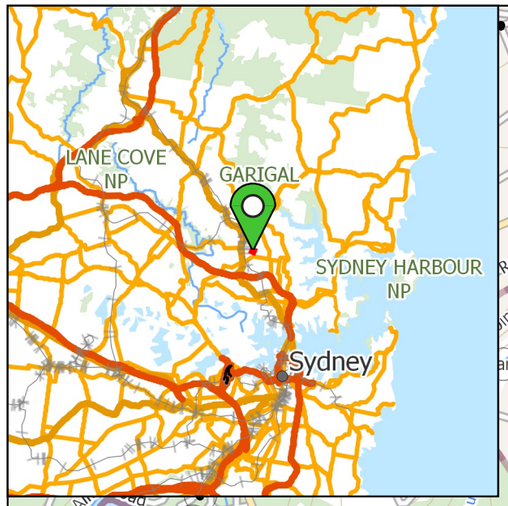
NSW Government (2006) *Department of Natural Resources Survey of Tidal Limits and Mangrove Limits in NSW Estuaries 1996 to 2005*, NSW Dept. Commerce – Manly Hydraulics Laboratory, Report MHL1286, April 2006.

NSW Government (2018) *Water Management (General) Regulation*.

NSW Government (2021) *Minimum Requirements for Building Site Groundwater Investigations and Reporting, Information for Developers and Consultants*, Department of Planning, Industry and Environment, January 2021.

NSW Government (2023) *Water Sharing Plans for the Greater Metropolitan Region Groundwater Sources 2023 under the Water Management Act 2000*, 27 June 2023.

Appendix A – Figures



0 300 600 900 1,200 m

LEGEND. Note: All locations are approximate

Site

eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	MO
Approved:	NK
Date:	20/05/2025

HPG General Pty Ltd

Hydrogeological Report including DMP and GSA

37 Archer Street, Chatswood NSW

Site Locality Plan

Figure: A1

Project: E26577.E16

Map Source:
NearMap, dated 26/11/2024

LEGEND. Note: all locations are approximate

Site Boundary

eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	T.Y.
Approved:	NK
Date:	26/11/2024

HPG General Pty Ltd

Hydrogeological Report including DMP and GSA

37 Archer Street, Chatswood NSW

Site Layout Plan

Figure:

A2

Project: E26577.E16

Groundwater elevation contours for groundwater depths measured manually on 22 April 2025

Bertram Street

BH1M
85.79 mAHD

BH2M
86.53 mAHD

BH3M
80.53 mAHD

86
85
84
83
82
81

Archer Street

0 10 20 30 40 m

Groundwater elevation contours for groundwater depths measured manually on 10 Febuary 2025

Bertram Street

BH1M
85.79 mAHD

BH2M
86.48 mAHD

BH3M
80.86 mAHD

86
85
84
83
82
81

Archer Street

Map Source: NSW SIXMaps, accessed 12/05/2025

LEGEND Note: Areas are approximate

- Site Boundary
- Groundwater Monitoring Well
- Inferred Groundwater Flow Direction
- Groundwater Contours (0.5m Interval)

eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	MO
Approved:	NK
Date:	20/05/2025

HPG General Pty Ltd

Hydrogeological Report including DMP and GSA

37 Archer Street, Chatswood NSW

Groundwater Contour Map

Figure: A3

Project: E26577.E16

Appendix B – Tables

Table B1 - Summary of Baseline Groundwater Quality - Analytical Results

E26724 - Kensington

Sample ID	Sampling Date	Metals																							PAHs			BTEX					VOCs
		Total As	Cd	[1] Total Cr	Cu	Pb	Hg	Ni	Zn	Al (pH>6.5)	Sb	Ba	Be	B	Co	Fe	Li (mg/L)	Mn	Mo	Se	SiO_2 (mg/L)	Ag	Sr	U	V	Total PAHs	Benzo(a)pyrene	Naphthalene	Benzene	Toluene	Ethylbenzene	o-xylene	m/p-xylene	Total VOCs
Groundwater Investigation (EI, 2025)																																	
GW-BH1M	22/4/2025	2	<0.1	<1	<1	<1	<0.5	86	290	550	<1	20	2	41	85	46000	0.062	2300	<1	<1	21	<0.1	89	<1	<1	N.A.	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<1	<10
GW-BH2M		<1	0.1	2 *	1	<1	<0.5	89	340	4000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<0.1	0.1	<0.5	1.4	<0.5	<0.5	<1	<10
GW-BH3M		<1	<0.1	1	3	<1	<0.5	40	77	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<1	<10
Guidelines																																	
Discharge Water Quality Criteria		24 (As III) 13 (As V)	0.06	3.3 (Cr III) 1 (Cr VI)	14	3.4	0.06	11	80	55	9			1.4		1900	34	11		0.05		0.5	6		0.1	16	950	180	80	350	275				

Sample ID	Sampling Date	Petroleum Hydrocarbons			Microbiological Organisms			Total Phenols	Total Cyanide	PFAS			Other																						
		Oil & Grease	TRH C6 - C9	TRH C10 - C40	Faecal coliforms CFU/100mL	Faecal streptococci	Escherichia coli (E. coli)			PFOS	PFOS + PFHxs	PFOA	Flouride (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Bromide (mg/L)	Ammonia Nitrogen $_3$NH as N (mg/L)	Nitrate Nitrogen NO3-N (mg/L)	Nitrite Nitrogen NO2 as N (mg/L)	Total Oxidised Nitrogen, NOx-N (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen (calc) (mg/L)	Total Phosphorus (Kjeldahl) as P (mg/L)	Filterable Reactive Phosphorus as P (mg/L)	Bicarbonate Alkalinity as CaCO3 (mg/L)	Carbonate Alkalinity as CaCO3 (mg/L)	Hydroxide Alkalinity as CaCO3 (mg/L)	Total Alkalinity as CaCO3 (mg/L)	Hydroxide Alkalinity as OH (mg/L)	Bicarbonate Alkalinity as HCO3 (mg/L)	Carbonate Alkalinity as CO3 (mg/L)	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	K (mg/L)
Groundwater Investigation (EI, 2024)																																	
GW-BH1M	22/4/2025	NA	<40	2300 [2]	<1	NA	<1	<50	<4	<0.01	<0.01	<0.01	<0.10	1200	85	3	240	<5	7	7	720	730	560	<5	18	<5	<5	18	<5	22	<5	15	81	580	7.3
GW-BH2M		NA	<40	<320 [2]	NA	NA	NA	<50	<4	<0.01	<0.01	<0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6.8	68	NA	NA
GW-BH3M		NA	<40	<320 [2]	NA	NA	NA	<50	<4	<0.01	<0.01	<0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28	46	NA	NA
Guidelines																																	
Discharge Water Quality Criteria			If TPH is detected analysis for BTEX and PAH is required					320	7	0.13		220					900	700		40		500	50	20										

Notes:

All values are µg/L unless stated otherwise

NA = Not Analysed

Water quality criteria are based on the ANZG, 2018 (Rev. Jan 2024) 95% fresh water DGVs, or relevant default guidelines where ANZG fresh water DGVs are not currently available, as explained in the footnotes to **Table 5-1**, in **Section 5** of the DMP.

1 This result was for *Total Chromium*. Chromium speciation testing was not undertaken, but should be included in future monitoring.

2 TRH result was obtained using silica gel clean-up method, to allow quantification of non-natural organic sources only.

* Speciation testing for CrVI is required to confirm if CrVI criterion is exceeded.

Highlighted value does not meet the adopted criteria

No relevant criteria are currently available

eiaustralia
Contamination | Remediation | Geotechnical

Table B2 – Summary of Baseline Groundwater Quality Results: Physicochemical Characteristics

E26724 - Kensington

Sample ID	Date sampled	Physiochemical Characteristics												Aesthetic Properties
		Electrical Conductivity (Field EC) (µs/cm)	Electrical Conductivity (Lab EC) (µs/cm)	pH (field)	pH (lab)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Field Redox (mV)	Hardness (mg $CaCO_3/L$)	Dissolved Oxygen (field DO) (mg/kg)	Dissolved Oxygen (Lab DO) (mg/L)	Total Organic Carbon as NPOC (mg/L)	Oil & Grease (present/absent)
Groundwater Investigation (EI, 2024)														
GW-BH1M	22/4/2025	3815	1700	4.38	5	2200	4300	6700	5.2	18.39	10.13	N.A.	1.8	Absent
GW-BH2M		3220	1600	3.68	4	1800	N.A.	4.5	0.8	N.A.	25.38	N.A.	N.A.	Absent
GW-BH3M		3166	1400	4.64	4.9	1800	N.A.	140	2.7	N.A.	26.54	N.A.	N.A.	Absent
Guidelines														
Discharge Water Quality Criteria		2000	2000	6.5 - 8.0	6.5 - 8.0			50						No visible sheens, surface films or oil and grease

Notes:

All values are in units as shown.

NA = Not Analysed

Water quality criteria are based on the ANZG, 2018 (Rev. Jan 2024) 95% fresh water DGVs, or relevant default guidelines where ANZG Fresh DGVs are not currently available, as explained in the footnotes to **Table 5-1**, in **Section 5** of the DMP.

Highlighted value does not meet the adopted criteria

No relevant criteria are currently available

eiaustralia
Contamination | Remediation | Geotechnical

Table B3 Summary of QA/QC Results for Groundwater Samples

E26577_Chatswood

Sample identification	Sampled Date	Description	TRH				BTEX				Heavy Metals							
			F1*	F2**	F3 (>C_{16} - C_{34})	F4 (>C_{34} - C_{40})	Benzene	Toluene	Ethylbenzene	Xylene (total)	Arsenic	Cadmium	Chromium (Total)	Copper	Lead	Mercury	Nickel	Zinc
Intra-laboratory Duplicate																		
GW_BH1M	22/4/2025	Groundwater	<50	370	1000	870	<0.5	<0.5	<0.5	<1.5	2	<0.1	<1	<1	<1	<0.05	86	290
GW_QD1		Replicate of GW_BH1M	<50	<60	<500	<500	<0.5	<0.5	<0.5	<1.5	2	<0.1	<1	<1	<1	<0.05	84	280
RPD			***0.00***	**155.00**	**80.00**	**66.07**	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***2.35***	***3.51***
Inter-laboratory Duplicate																		
GW_BH1M	22/4/2025	Groundwater	<50	370	1000	870	<0.5	<0.5	<0.5	<1.5	2	<0.1	<1	<1	<1	<0.05	86	290
GW_QT1		Replicate of GW_BH1M	<10	<50	<100	<100	<1	<1	<1	<3	<1	<0.1	<1	<1	<1	<0.05	1	1
RPD			***NA***	**162.03**	**171.43**	**167.39**	***NA***	***NA***	***NA***	***NA***	**80.00**	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	**195.40**	**198.63**
GW_QTB1	22/04/2025	Trip blank	-	-	-	-	<0.5	<0.5	<0.5	<1.5	-	-	-	-	-	-	-	-
GW_QTS1		Trip spike	-	-	-	-	[101%]	[100%]	[100%]		-	-	-	-	-	-	-	-
GW_QR1		Rinsate	<50	<60	<500	<500	<0.5	<0.5	<0.5	<1.5	<1	<0.1	<1	<1	<1	<0.1	<1	6

Indicates values where a single result is found to be less than detection, with the duplicate sample found to be over the detection limit.

RPD exceeds 30-50% range referenced from AS4482.1 (2005)

NOTE:

All soil results are reported in mg/kg . All water results are reported in µg/L.

* - to obtain F1 subtract the sum of BTEX concentrations from the C_6-C_{10} fraction

** - to obtain F2 subtract naphthalene from the > C_{10}-C_{16} fraction

eiaustralia

Appendix C – Proposed Development Plans

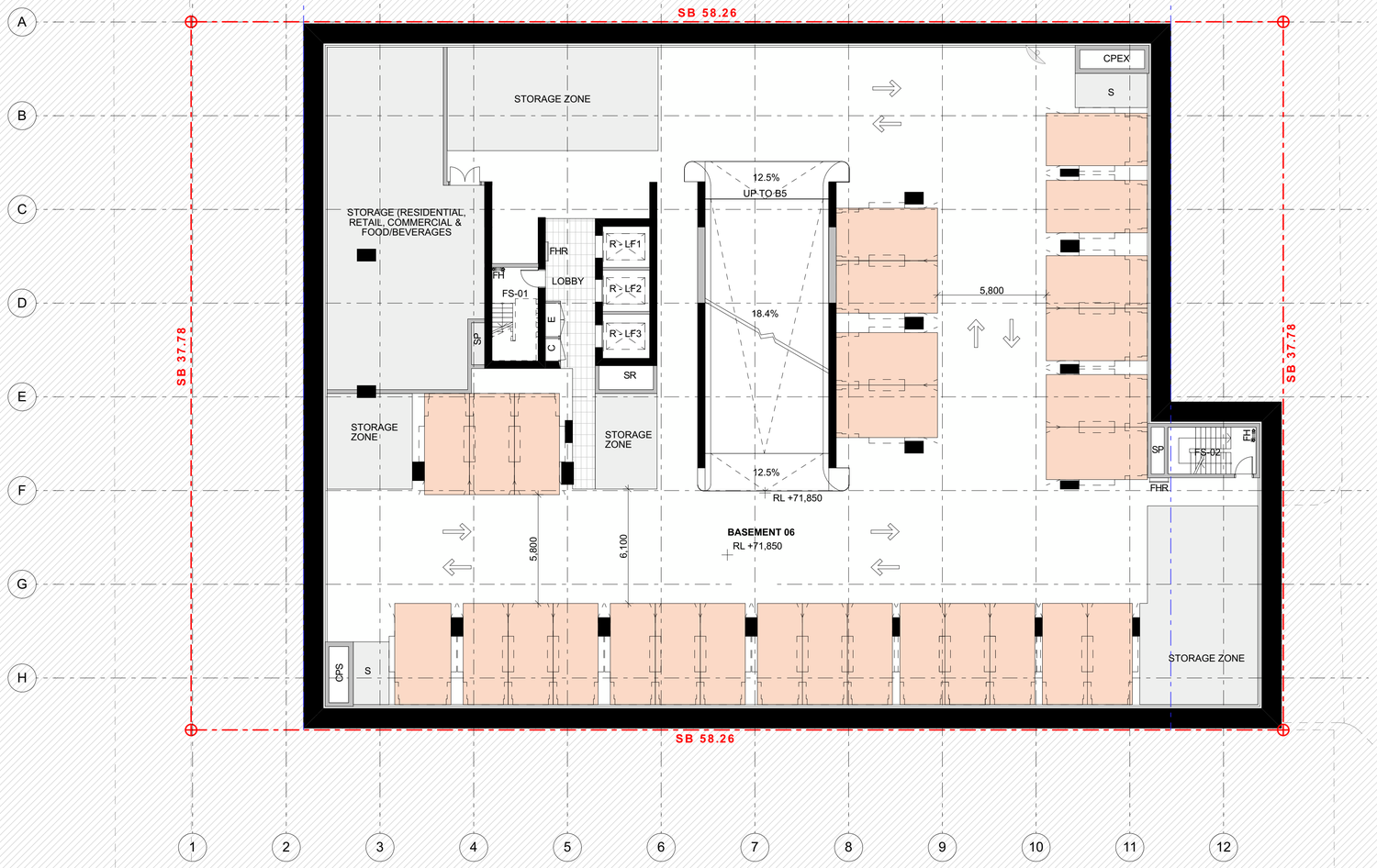
47-49 ARCHER STREET
2 STOREY
TOWN HOUSES

G SSDA 208 | A SSDA 205 | F SSDA 208 | E SSDA 207

45 ARCHER STREET
2 STOREY
TOWNHOUSES

42 ARCHER STREET
26 STOREY
APARTMENT BUILDING
APPROVED FOR
CONSTRUCTION

40 ARCHER STREET
9 STOREY
APARTMENTS



B SSDA 206

C SSDA 207

D SSDA 207

BERTRAM STREET

ARCHER STREET

36 ARCHER STREET
9-STOREY
APARTMENTS

31 - 35 ARCHER STREET
14 STOREY APARTMENT BUILDING
UNDER ASSESSMENT

22-28 BERTRAM STREET
2 STOREY
TOWNHOUSES

GENERAL NOTES
© FUSE ARCHITECTURE.
•NO REPRODUCTION WITHOUT PERMISSION, UNLESS NOTED OTHERWISE.
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Thursday, 20 March 2025 @ 9:40 AM
© FUSE ARCHITECTS.

LEGEND

- COMMERCIAL PARKING
- RETAIL PARKING
- FOOD AND BEVERAGE PARKING
- RESIDENTIAL PARKING
- RESIDENTIAL VISITOR PARKING
- SHARED ZONE
- S — STORAGE CAGES
- ACCESSIBLE CARSPACE
- B — BOLLARD
- R - LF — RESIDENTIAL LIFT
- C - LF — COMMERCIAL LIFT

BASEMENT 06
28 CAR PARKING SPACES

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N

0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

JOB NO
2332

CHECKED: AA/JSN/CH
DRAWN: KH/BC
DATE CREATED: OCTOBER 2024
SCALE: 1:150 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
BASEMENT 06 PLAN

SHEET NO. SSDA 101
REVISION. A

47-49 ARCHER STREET
2 STOREY
TOWN HOUSES

G SSDA 208 | A SSDA 205 | F SSDA 208 | E SSDA 207

45 ARCHER STREET
2 STOREY
TOWNHOUSES

42 ARCHER STREET
26 STOREY
APARTMENT BUILDING
APPROVED FOR
CONSTRUCTION

40 ARCHER STREET
9 STOREY
APARTMENTS

36 ARCHER STREET
9-STOREY
APARTMENTS

31 - 35 ARCHER STREET
14 STOREY APARTMENT BUILDING
UNDER ASSESSMENT

22-28 BERTRAM STREET
2 STOREY
TOWNHOUSES

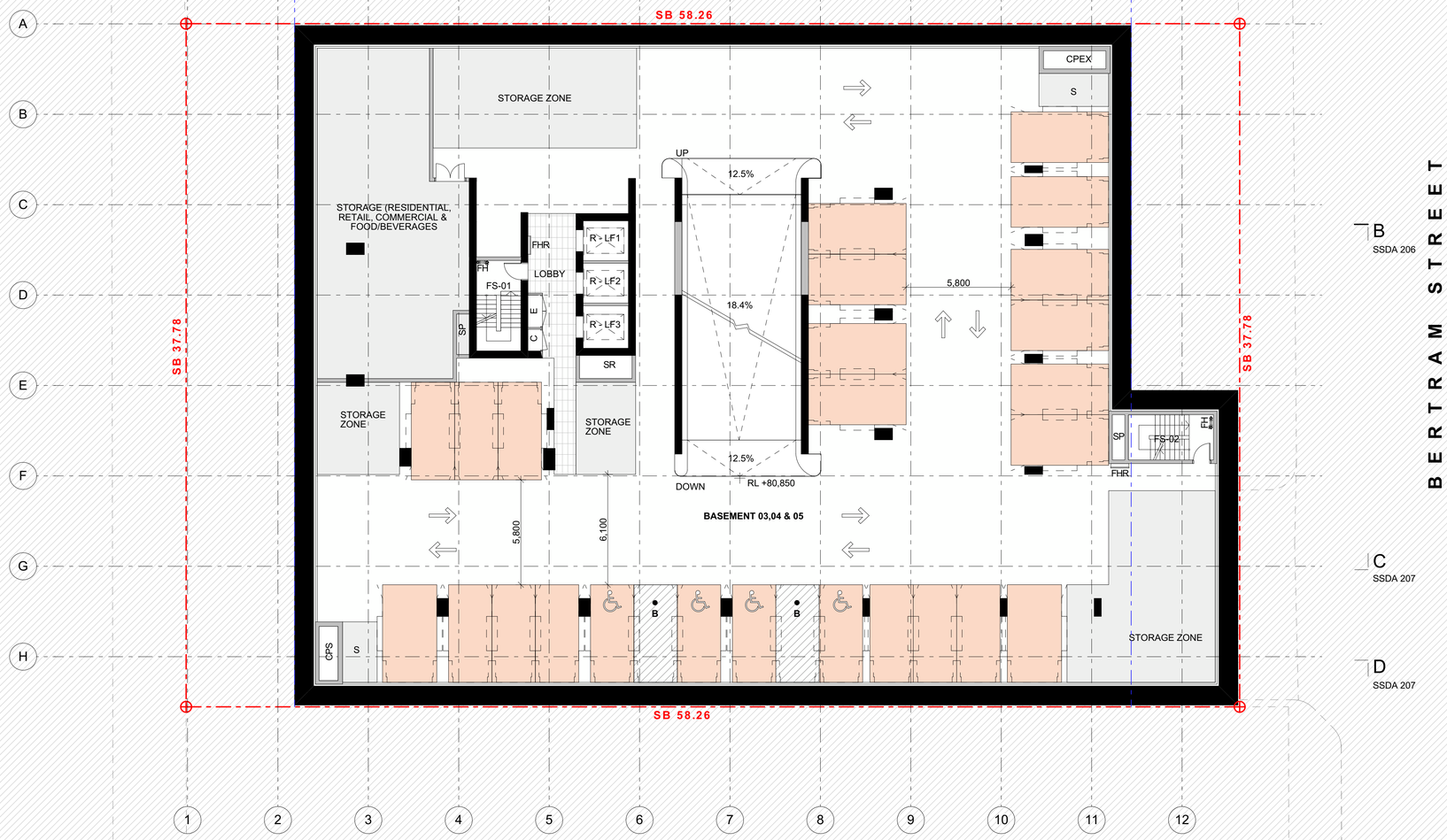
ARCHER STREET

BERTRAM STREET

B SSDA 206

C SSDA 207

D SSDA 207



GENERAL NOTES
© FUSE ARCHITECTURE.
•NO REPRODUCTION WITHOUT PERMISSION, UNLESS NOTED OTHERWISE.
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Thursday, 20 March 2025 @ 9:40 AM

LEGEND

- COMMERCIAL PARKING
- RETAIL PARKING
- FOOD AND BEVERAGE PARKING
- RESIDENTIAL PARKING
- RESIDENTIAL VISITOR PARKING
- SHARED ZONE
- S — STORAGE CAGES
- ACCESSIBLE CARSPACE
- B — BOLLARD
- R - LF — RESIDENTIAL LIFT
- C - LF — COMMERCIAL LIFT

BASEMENT 03
25 CAR PARKING SPACES
BASEMENT 04
25 CAR PARKING SPACES
BASEMENT 05
25 CAR PARKING SPACES

TOTAL
75 CAR SPACES

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N
0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/BC

DATE CREATED	SCALE	
OCTOBER 2024	1:150 @ A1	50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
TYPICAL BASEMENT 03-05 PLAN

SHEET NO.	REVISION.
SSDA 102	A

47-49 ARCHER STREET
2 STOREY
TOWN HOUSES

G SSDA 208 | A SSDA 205 | F SSDA 208 | E SSDA 207

45 ARCHER STREET
2 STOREY
TOWNHOUSES

42 ARCHER STREET
26 STOREY
APARTMENT BUILDING
APPROVED FOR
CONSTRUCTION

40 ARCHER STREET
9 STOREY
APARTMENTS

36 ARCHER STREET
9-STOREY
APARTMENTS

31 - 35 ARCHER STREET
14 STOREY APARTMENT BUILDING
UNDER ASSESSMENT

22-28 BERTRAM STREET
2 STOREY
TOWNHOUSES

LEGEND

- COMMERCIAL PARKING
- RETAIL PARKING
- FOOD AND BEVERAGE PARKING
- RESIDENTIAL PARKING
- RESIDENTIAL VISITOR PARKING
- SHARED ZONE
- S — STORAGE CAGES
- ACCESSIBLE CARSPACE
- B — BOLLARD
- R - LF — RESIDENTIAL LIFT
- C - LF — COMMERCIAL LIFT

BASEMENT 02
26 CAR PARKING SPACES

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE—ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/BC

DATE CREATED	SCALE	
OCTOBER 2024	1:150 @ A1	50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
BASEMENT 02 PLAN

SHEET NO.	REVISION.
SSDA 103	A

47-49 ARCHER STREET
2 STOREY
TOWN HOUSES

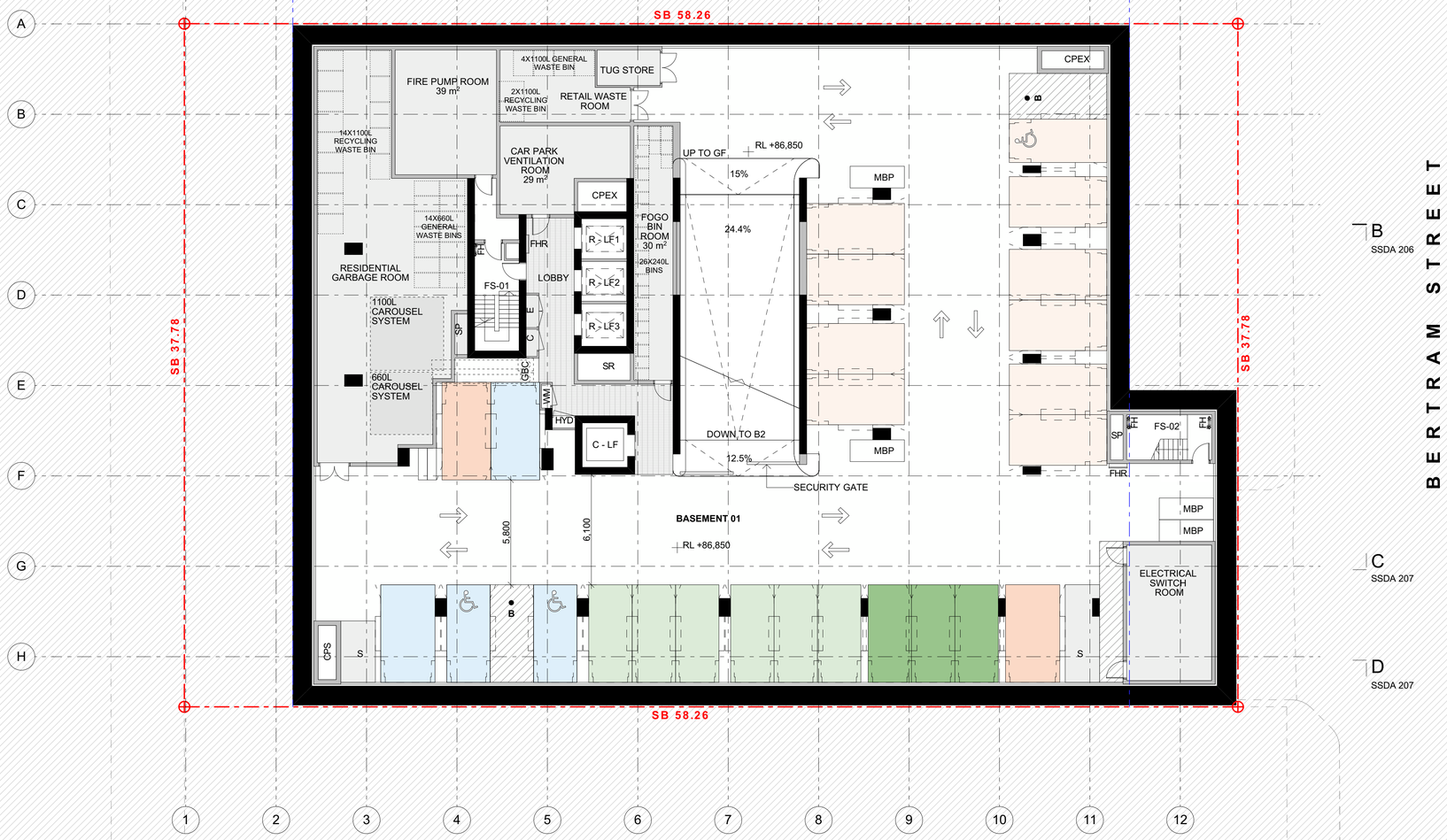
G SSDA 208 | A SSDA 205 | F SSDA 208 | E SSDA 207

45 ARCHER STREET
2 STOREY
TOWNHOUSES

42 ARCHER STREET
26 STOREY
APARTMENT BUILDING
APPROVED FOR
CONSTRUCTION

40 ARCHER STREET
9 STOREY
APARTMENTS

ARCHER STREET



BERTRAM STREET

36 ARCHER STREET
9-STOREY
APARTMENTS

31 - 35 ARCHER STREET
14 STOREY APARTMENT BUILDING
UNDER ASSESSMENT

22-28 BERTRAM STREET
2 STOREY
TOWNHOUSES

LEGEND

- COMMERCIAL PARKING
- RETAIL PARKING
- FOOD AND BEVERAGE PARKING
- RESIDENTIAL PARKING
- RESIDENTIAL VISITOR PARKING
- SHARED ZONE
- S — STORAGE CAGES
- ACCESSIBLE CARSPACE
- B — BOLLARD
- R - LF — RESIDENTIAL LIFT
- C - LF — COMMERCIAL LIFT

BASEMENT 01
25 CAR PARKING SPACES

PARKING SCHEDULE

Total residential car parking spaces	123
Total residential visitor car parking spaces	18
Total commercial car parking spaces	4
Total retail car parking spaces	3
Total food and beverage car parking spaces	6
TOTAL:	**154**
Accessible residential car parking spaces	16
Accessible residential visitor car parking spaces	1
Accessible commercial car parking spaces	2
TOTAL: [Included within total parking provisions]	19
Residential bike parking spaces	13
Residential visitor bike parking spaces	13
Commercial bike parking spaces	2
TOTAL:	28

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N
0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/BC
DATE CREATED	SCALE
OCTOBER 2024	1:150 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
BASEMENT 01 PLAN

SHEET NO.	REVISION.
SSDA 104	A

47-49 ARCHER STREET
2 STOREY
TOWN HOUSES

G SSDA 208 | A SSDA 205 | F SSDA 208 | E SSDA 207

45 ARCHER STREET
2 STOREY
TOWNHOUSES

42 ARCHER STREET
26 STOREY
APARTMENT BUILDING
APPROVED FOR
CONSTRUCTION

40 ARCHER STREET
9 STOREY
APARTMENTS

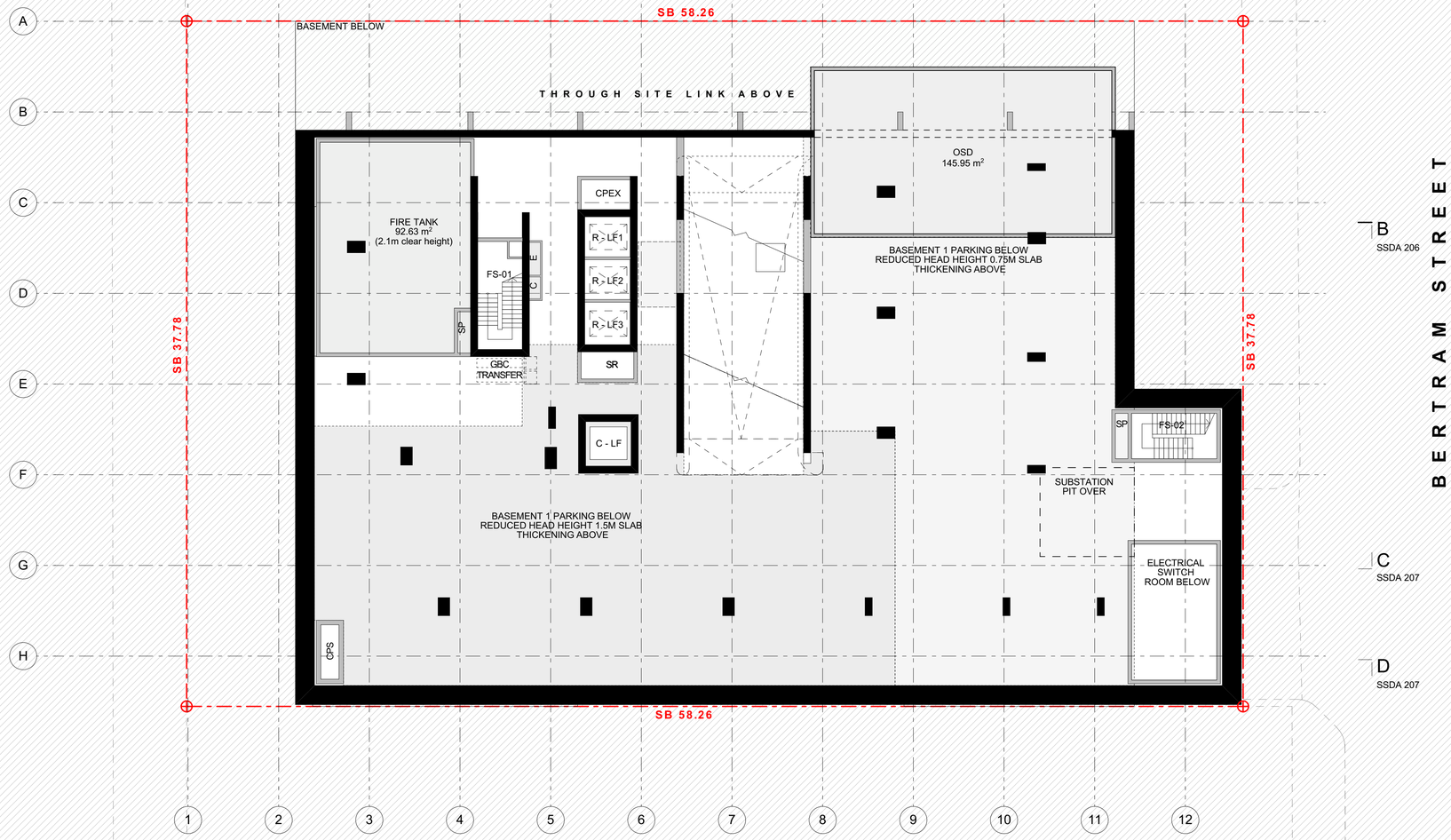
36 ARCHER STREET
9-STOREY
APARTMENTS

31 - 35 ARCHER STREET
14 STOREY APARTMENT BUILDING
UNDER ASSESSMENT

22-28 BERTRAM STREET
2 STOREY
TOWNHOUSES

ARCHER STREET

BERTRAM STREET



GENERAL NOTES
© FUSE ARCHITECTURE.
•NO REPRODUCTION WITHOUT PERMISSION, UNLESS NOTED OTHERWISE.
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Thursday, 20 March 2025 @ 9:40 AM
© FUSE ARCHITECTS.

LEGEND

- COMMERCIAL PARKING
- RETAIL PARKING
- FOOD AND BEVERAGE PARKING
- RESIDENTIAL PARKING
- RESIDENTIAL VISITOR PARKING
- SHARED ZONE
- S — STORAGE CAGES
- ACCESSIBLE CARSPACE
- B — BOLLARD
- R - LF — RESIDENTIAL LIFT
- C - LF — COMMERCIAL LIFT

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE—ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N
0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

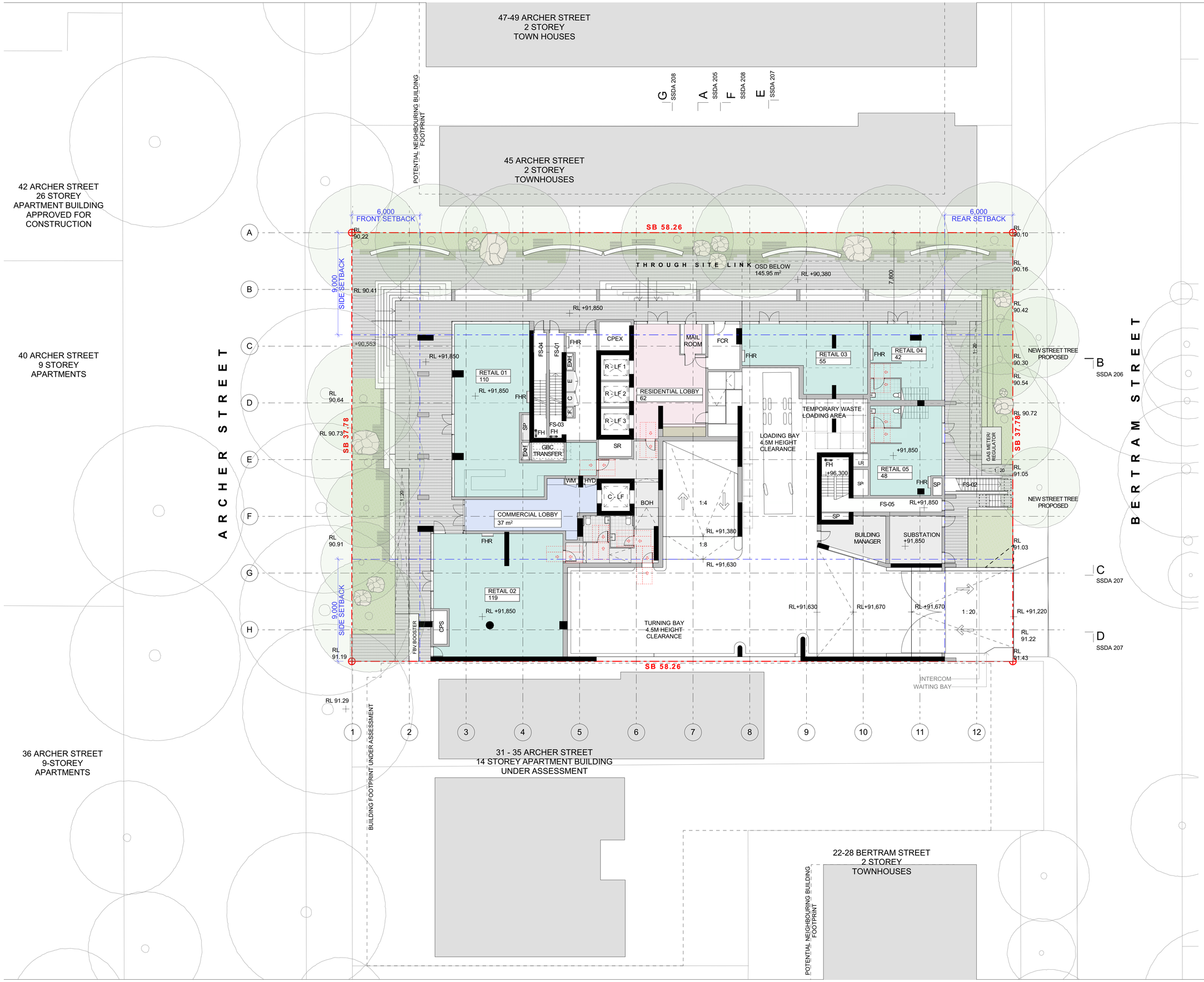
JOB NO
2332

CHECKED: AA/JSN/CH
DRAWN: BC
DATE CREATED: OCTOBER 2024
SCALE: 1:150 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
BASEMENT 01 MEZZANINE PLAN

SHEET NO. SSDA 105
REVISION. A



GENERAL NOTES
© FUSE ARCHITECTURE.
•NO REPRODUCTION WITHOUT PERMISSION, UNLESS NOTED OTHERWISE.
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Thursday, 20 March 2025 @ 9:40 AM

LEGEND

- 1 BED APARTMENT
- 2 BED APARTMENT
- 3 BED APARTMENT
- 4 BED APARTMENT
- COMMERCIAL
- RETAIL
- RESIDENTIAL LOBBY

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N
0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

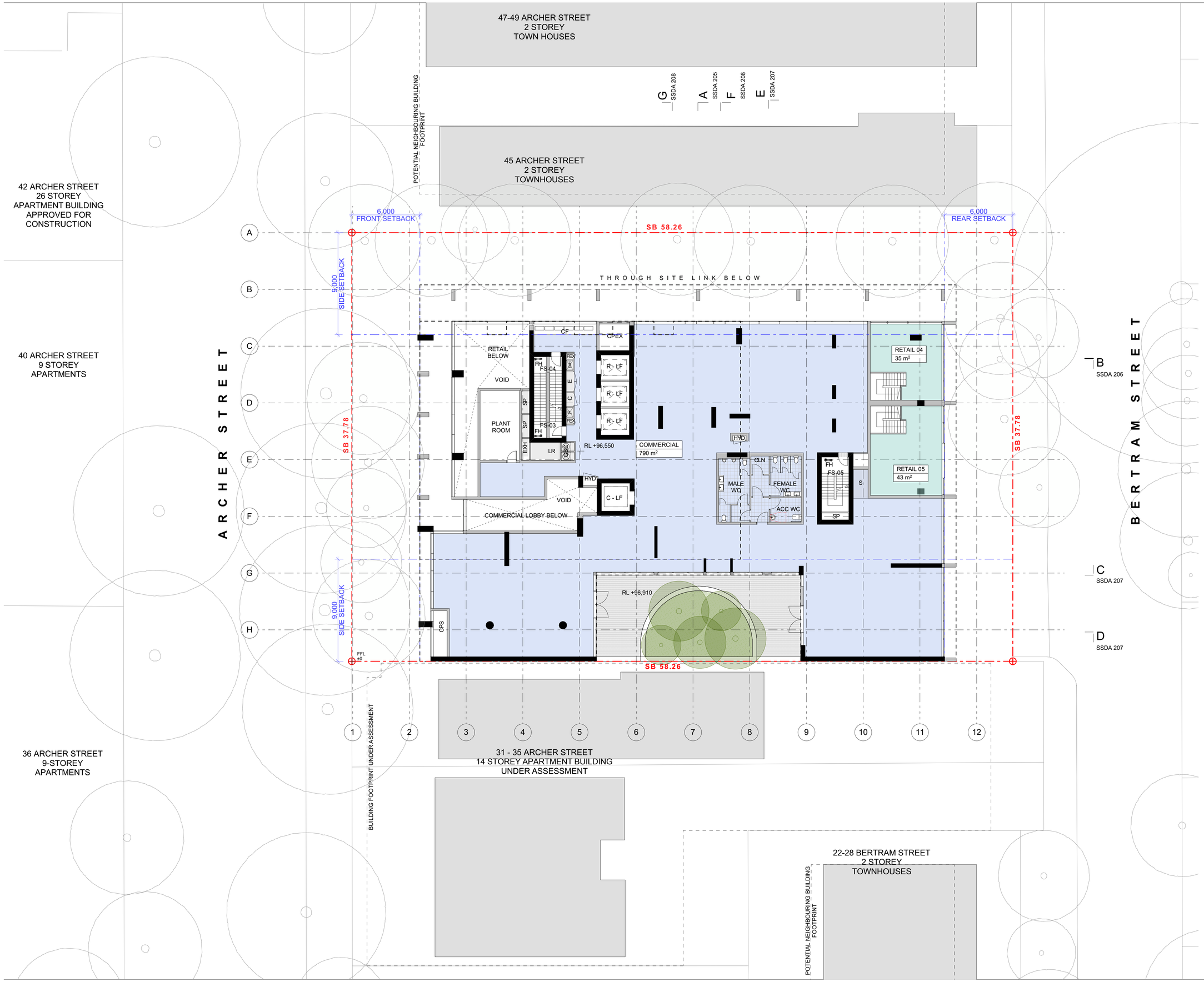
JOB NO
2332

CHECKED: AA/JSN/CH
DRAWN: SL/BC
DATE CREATED: OCTOBER 2024
SCALE: 1:150 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
GROUND FLOOR PLAN

SHEET NO. SSDA 106
REVISION. A



GENERAL NOTES
© FUSE ARCHITECTURE.
•NO REPRODUCTION WITHOUT PERMISSION, UNLESS NOTED OTHERWISE.
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Thursday, 20 March 2025 @ 9:40 AM

LEGEND

- 1 BED APARTMENT
- 2 BED APARTMENT
- 3 BED APARTMENT
- 4 BED APARTMENT
- COMMERCIAL
- RETAIL
- RESIDENTIAL LOBBY

REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

N
0 2 5 10

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

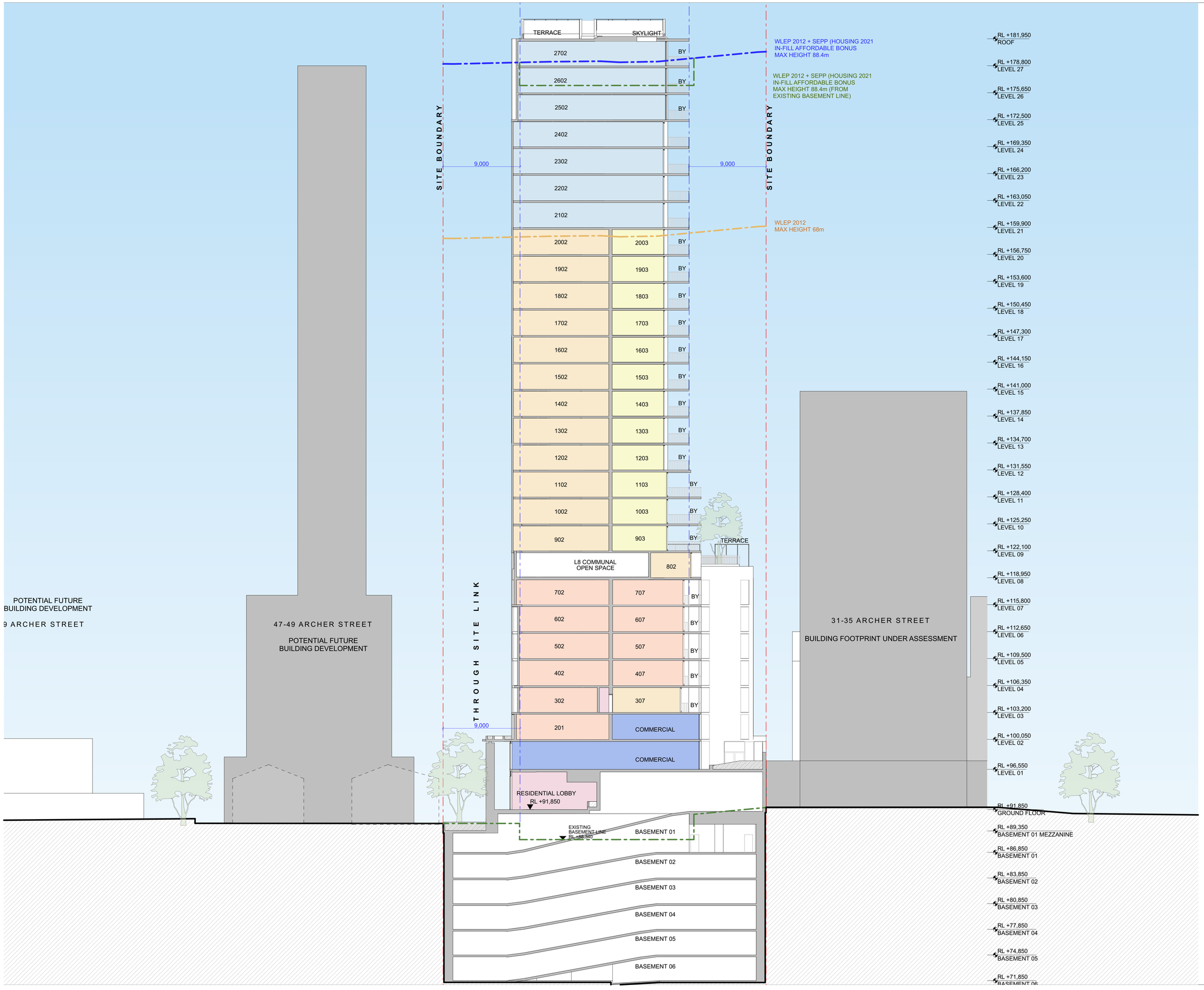
JOB NO
2332

CHECKED: AA/JSN/CH
DRAWN: KH/BC
DATE CREATED: OCTOBER 2024
SCALE: 1:150 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
LEVEL 01 PLAN

SHEET NO. SSDA 107
REVISION. A



GENERAL NOTES

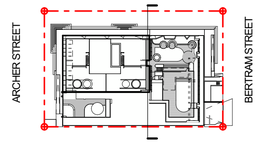
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Tuesday, 25 Febraary 2025 @ 10:18 AM

LEGEND

- 1 BED APARTMENT
- 2 BED APARTMENT
- 3 BED APARTMENT
- 4 BED APARTMENT
- COMMERCIAL
- RETAIL
- RESIDENTIAL LOBBY

KEYPLAN



REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

0 2 5 10m

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

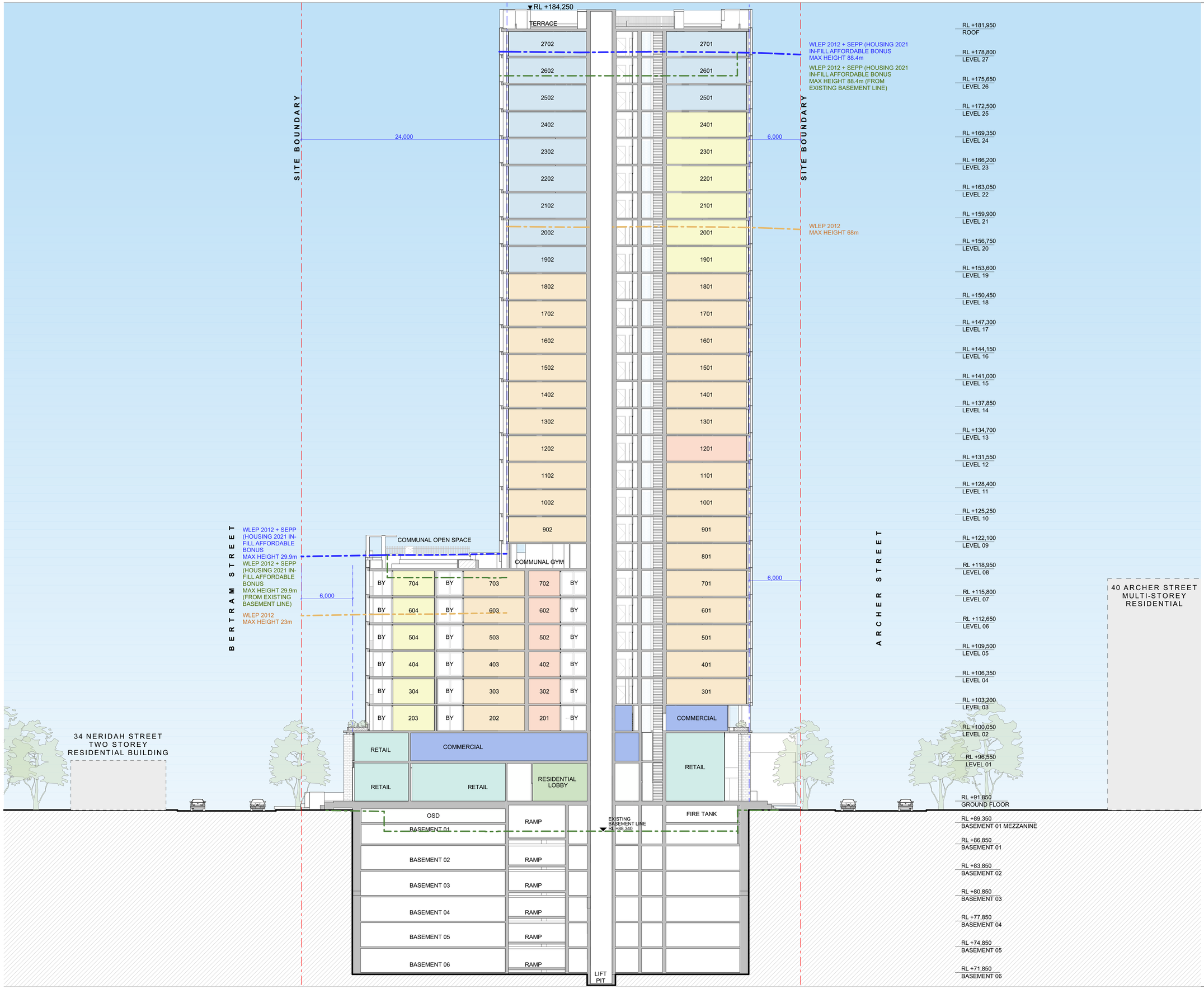
JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/SL/NB/BC
DATE CREATED	SCALE
OCTOBER 2024	1:200 @ A1 50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
SECTION A

SHEET NO.	REVISION.
SSDA 205	A



GENERAL NOTES

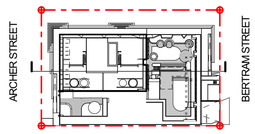
•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Tuesday, 25 February 2025 @ 10:18 AM

LEGEND

- 1 BED APARTMENT
- 2 BED APARTMENT
- 3 BED APARTMENT
- 4 BED APARTMENT
- COMMERCIAL
- RETAIL
- RESIDENTIAL LOBBY

KEYPLAN



REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

0 2 5 10m

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

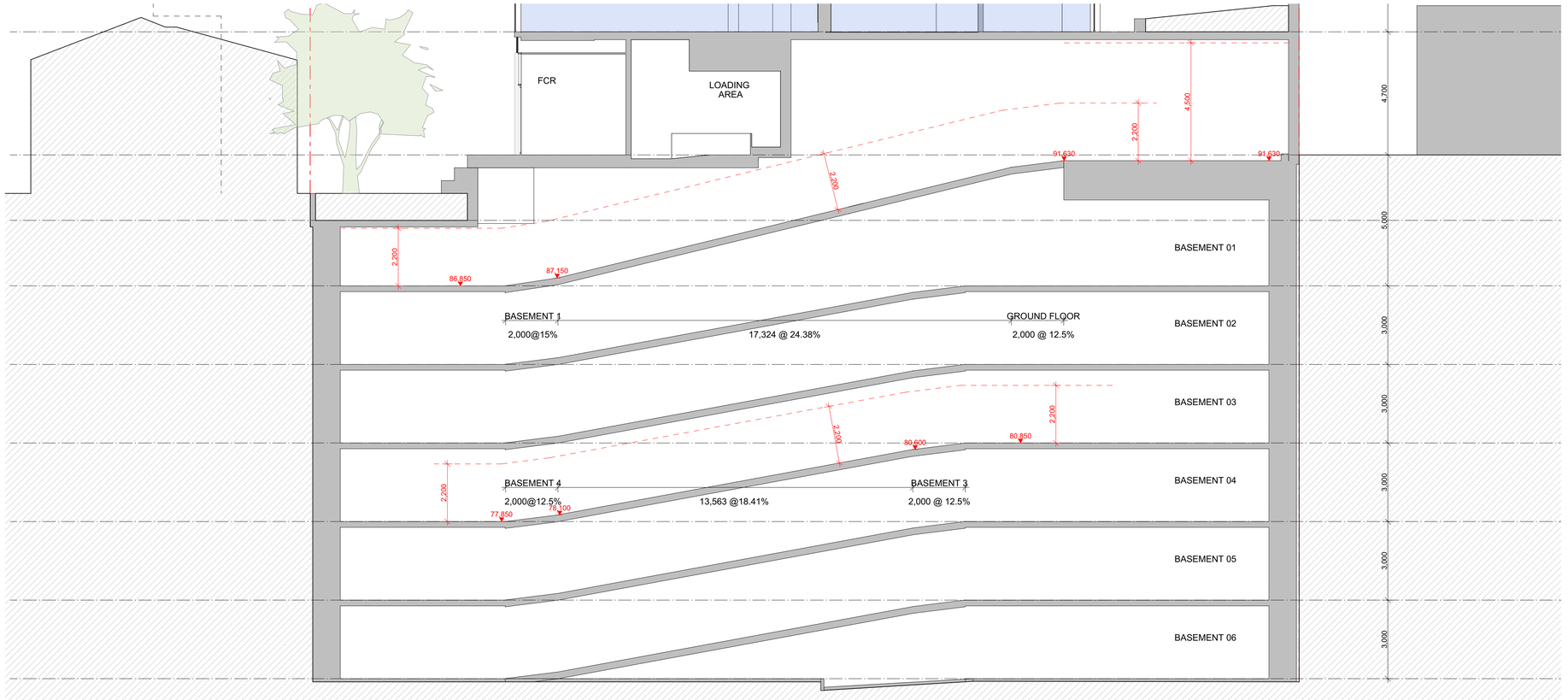
JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/SL/NB/BC
DATE CREATED	SCALE
OCTOBER 2024	1:200 @ A1 50% @ A3

PROJECT STATUS
SSDA

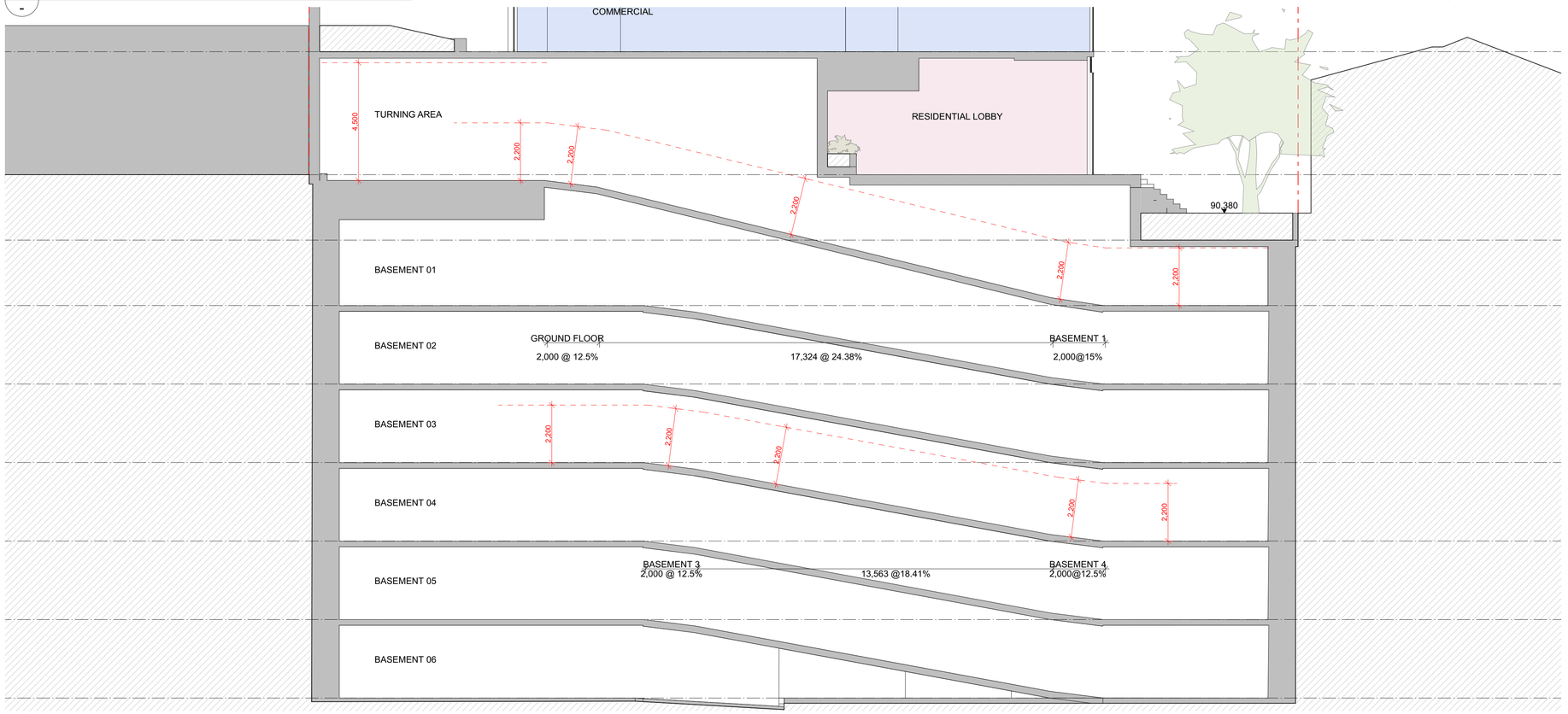
DRAWING TITLE
SECTION B

SHEET NO.	REVISION.
SSDA 206	A



1
-

SECTION F [DRIVEWAY RAMP EAST]



2
-

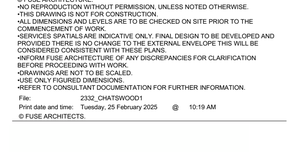
SECTION G [DRIVEWAY RAMP WEST]

GENERAL NOTES

•THIS DRAWING IS NOT FOR CONSTRUCTION.
•ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
•SERVICES SPATIALS ARE INDICATIVE ONLY. FINAL DESIGN TO BE DEVELOPED AND PROVIDED THERE IS NO CHANGE TO THE EXTERNAL ENVELOPE THIS WILL BE CONSIDERED CONSISTENT WITH THESE PLANS.
•INFORM FUSE ARCHITECTURE OF ANY DISCREPANCIES FOR CLARIFICATION BEFORE PROCEEDING WITH WORK.
•DRAWINGS ARE NOT TO BE SCALED.
•USE ONLY FIGURED DIMENSIONS.
•REFER TO CONSULTANT DOCUMENTATION FOR FURTHER INFORMATION.

File: 2332_CHATSWOOD1
Print date and time: Tuesday, 25 February 2025 @ 10:19 AM

KEYPLAN



REVISION ID	AMENDMENT	DATE
A	FOR SSDA ISSUE	25/02/2025

ARCHITECT
FUSE ARCHITECTS
STUDIO 64
61 MARLBOROUGH STREET
SURRY HILLS NSW 2010
MAIL@FUSEARCHITECTURE.COM.AU
PHONE 02 8278 7156
ABN 81 612 046 643
NOMINATED ARCHITECT RACHID ANDARY NSW ARB 8627

CLIENT
HYECORP
HERITAGE HOUSE, SUITE 1 256 VICTORIA AVENUE
CHATSWOOD NSW 2067

SITE ADDRESS
37 ARCHER STREET
CHATSWOOD NSW 2067

JOB NO
2332

CHECKED	DRAWN
AA/JSN/CH	KH/SL/NB/BC

DATE CREATED	SCALE	
OCTOBER 2024	1:100 @ A1	50% @ A3

PROJECT STATUS
SSDA

DRAWING TITLE
BASEMENT RAMP SECTIONS

SHEET NO.	REVISION.
SSDA 208	A

Appendix D – Groundwater Seepage Analysis and Groundwater Level Monitoring Report

23 May 2025
E26577.G12_Rev1

Adrian Giardina
Hyecorp
Heritage House, 256 Victoria Road
CHATSWOOD, NSW 2067

EI Australia
Suite 6.01, 55 Miller Street
PYRMONT, NSW 2009

ABN 42 909 129 957

E service@eiaustralia.com.au
W www.eiaustralia.com.au
T 02 9516 0722

Groundwater Seepage Analysis
37 Archer Street, Chatswood NSW

1 INTRODUCTION

1.1 Background

At the request of Adrian Giardina on behalf of Hyecorp (the Client), EI Australia (EI) has prepared this Groundwater Seepage Analysis (GSA) for a proposed development at 37 Archer Street, Chatswood NSW (the site).

1.2 Proposed Development

The following documents, supplied by the Client, were used to assist in the preparation of this analysis:

- Architectural drawings prepared by Fuse Architects – Reference No. 2332, Revision A, dated 25 February 2025; and
- Site Survey plan prepared by LTS Surveyors – Reference No. 52119001DT, Sheets 1 to 6, Revision C, dated 11 April 2025.

EI has prepared the following reports for this site:

- Groundwater Level Monitoring Report No.2 – Reference No. E26577.G11.GW02, dated 23 May 2025; and
- Preliminary Geotechnical Investigation (PGI) report – Reference No. E26577.G03_Rev2, dated 23 May 2025.

The datum adopted in the above documents is in Australian Height Datum (AHD), hence all Reduced Levels (RL) mentioned in this GSA report are henceforth in AHD.

Based on the provided documents, EI understands that the proposed development involves demolition of the existing apartment building for the construction of a new 27 storey residential building overlying a six (6) level basement. The lowest basement level is proposed to have a Finished Floor Level (FFL) of RL 71.85 m AHD. A Bulk Excavation Level (BEL) of RL 71.5 m AHD is assumed, which includes allowance for the construction of the basement slab. To achieve the BEL, excavation depth of approximately 20 m from Below Existing Ground Level (BEGL) has been estimated. Locally deeper excavations may be required for footings, lift overrun pits, crane pads, and service trenches. The proposed basement extends to the northern, southern & south eastern side boundaries, and is setback 6.0m from the western and north eastern site boundaries.

1.3 Assessment Objectives

The objective of this GSA is to provide an estimation of the groundwater take volumes that require pumping out during the construction and operational stages of the development, estimation of the groundwater drawdown as a result of the dewatering, and any associated ground settlements.

2 SITE MODEL

Due to the site is located in a gently sloping topography, a cross **Section A-A** was adopted as a representative section in this seepage analysis. This section runs throughout the entire perimeter of the proposed basement excavation. The location of the modelled section is shown in **Figure 1**.

2.1 Subsurface Conditions

For the purpose of this GSA, the average subsurface conditions outlined in EI's PGI report have been adopted. A summary of the permeability values which were adopted for the assessment of groundwater take volumes are presented in **Table 1** below.

Table 1 Summary of Subsurface Conditions and Adopted Design Parameters

Unit	Material [1]	RL of Top of Unit (m AHD)	Adopted Permeability (m/s)	$K_{vertical}/K_{Horizontal}$
1	**Fill** [2]	92.0	1.0×10^{-5}	1.0
2	**Residual Soil** [2]	88.2	1.0×10^{-7}	1.0
3	**Class V Shale/Sandstone** [3]	87.2	5.0×10^{-8}	0.5
4	**Class IV Shale/Sandstone or better** [4]	80.9	9.2×10^{-8}	0.2

Notes:

1 For more detailed descriptions of subsurface conditions reference should be made to the EI's PGI report.
2 Permeability values of Units 1 and 2 have been correlated using Look (2014).
3 Permeability value of Unit 3 has been correlated using Pells (2019).
4 Permeability value of Unit 4 has been adopted based on the average value of pump out test results encountered in borehole BH2M.

2.2 Groundwater Observations and Pump-Out Tests

Based on our PGI, the standing groundwater levels were manually measured in three monitoring wells installed by EI (BH1M, BH2M, and BH3M) during follow up groundwater monitoring events completed on 23 January and 17 February 2025. The recorded measurements are presented in **Table 2**.

Table 2 Summary of Groundwater Levels

Monitoring Well/ Borehole ID	Groundwater Levels		
	Measurement Date	m BEGL	RL (m AHD)
BH1M	23-Jan-25	4.58	85.52
	17-Feb-25	4.51	85.59
BH2M	23-Jan-25	1.50	86.51
	17-Feb-25	1.45	86.56
BH3M	17-Feb-25	9.95	80.95

As a part of the GSA scope, EI completed pump-out tests in the monitoring wells installed by EI (BH1M, BH2M and BH3M). The pump-out test involved initial removal of water from the well, then measuring the rise in water level at regular time intervals to assess the rate of water level recovery. The data was then used to calculate the hydraulic conductivity of the material screened by each well using the Hvorslev method (results are presented graphically in **Appendix B**. The monitoring wells and pump-out test results are summarised in **Table 3**.

Table 3 Monitoring Well Details and Pump Out Test Results

Monitoring Well/ Borehole ID	Total Well Depth (m BEGL)	Effective Screen Length (m)	Screened Section	Date of Test	Approximate RL of Groundwater Level (m AHD)	Calculated Permeability (m/s)
BH1M	18.26	6.0	Class IV Shale/Sandstone or better	22-Jan-25	85.72	2.65×10^{-8}
				22-Apr-25	85.79	2.71×10^{-8}
BH2M	18.00	6.0		22-Jan-25	86.44	7.71×10^{-8}
				29-Apr-25	86.54	1.11×10^{-7}
				19-May-25	86.69	8.64×10^{-8}
BH3M	22.10	6.0		13-Feb-25	80.91	2.35×10^{-8}
				29-Apr-25	80.53	2.43×10^{-8}

Additionally, a long-term continuous groundwater monitoring using data loggers installed within the three monitoring wells was completed in BH1M, BH2M, and BH3M from period 10 February 2025 to 22 April 2025. The full report and a summary of this continuous groundwater levels are provided in **Appendix C** and **Table 4**, respectively.

Table 4 Summary of Long-term Groundwater Monitoring

Monitoring Well/ Borehole ID	Average Groundwater RL (m AHD)	Highest Groundwater RL (m AHD)	Lowest Groundwater RL (m AHD)
BH1M	85.87	86.06	85.69
BH2M	86.55	86.69	86.43
BH3M	80.56	81.03	80.44

Based on the above discussion and the highest groundwater level observed by EI within BH2M, a design groundwater level of 87.7m AHD was adopted for this assessment. This ground water level has considered an additional 1m above the observed value to account for potential seasonal variations.

2.3 THE MAXIMUM EXTENT OF THE CONE OF DEPRESSION

The estimated maximum extent of the cone of depression has been determined using Sichardt's Formula, as follows:

$$R = 3000\,(H - h)\sqrt{k}$$

Where:

- R = Maximum extent of the cone of depression (m).
- H = Highest design groundwater level (m).
- h = Estimated groundwater level at the BEL due to full duration of dewatering (m).
- k = Hydraulic conductivity of the aquifer (m/s).

The coefficient of 3000 is based on empirical observations, predominantly for sandy aquifers. The lowest coefficient outlined in Sichardt's formula is approximately 1000, which would result in a smaller radius of influence. Therefore, using a coefficient of 3000 in this case is considered conservative.

Based on the formula above, the maximum extent of the cone of depression is estimated to be approximately 17 m from the basement outline. However, to maintain conservatism in the model when predicting the effective drawdown radius and potential drawdown-induced settlement due to the full duration of dewatering for the proposed development, a wider maximum extent of the cone of depression of 20 m from the basement outline has been adopted in the PLAXIS model.

2.4 Shoring System

The shoring system for the proposed excavation has been assumed as soldier piles wall accordance with the PGI report completed by EI, as the client has not provided the structural drawings for the shoring wall at the time of this assessment. Hence, in this analysis, the excavation faces or shoring system were modelled to be fully permeable.

This assessment does not assess the overall stability and embedment depth of the shoring system. Once final designs are made available, this assessment should be revised accordingly.

3 GROUNDWATER TAKE ASSESSMENT

3.1 Groundwater Seepage Volumes during Construction Phase

Groundwater seepage analysis during construction has been undertaken using PLAXIS 2D. PLAXIS 2D is a commercially available finite element package intended for two dimensional analysis in geotechnical engineering. It is equipped with features to deal with various aspects of geotechnical structures and construction processes using robust and theoretically sound computational procedures. PLAXIS 2D estimates the seepage rate of water entering the excavation. This model estimates the volume of water which will be required to be dewatered during the construction of the basement and until the dewatering is turned off.

For the purpose of this modelling, it has been assumed that:

- The subsurface conditions were horizontal along the site and a representative **Section A-A** is considered in the analysis running along the basement perimeter.
- The permeability values presented in **Table 1** were adopted for modelling each of the units.
- The shoring system is assumed to be a fully permeable soldier pile wall.
- Dewatering was undertaken to the bulk excavation level of RL 71.5 m AHD.
- The maximum extent of the cone of depression has been adopted as 20 m from the basement outline, as detailed in Section 2.3 of this report. Therefore, 20 m is adopted as the extent of PLAXIS model boundary.
- A “No-Flow” boundary is defined along the symmetric line (the centre of the excavation), at about 20 m from the perimeter basement excavation.
- The basement perimeter surrounding the basement excavation has a total length of about 180m.

The PLAXIS 2D results are presented in **Appendix A**. **Table 5** below provides the estimated groundwater inflow rate into the basement.

Table 5 Summary of Analysis Results

Inflow per m length of perimeter wall (m^3/day/m)	Inflow into excavation (m^3/day)	Total Inflow per year (ML/year)	Estimated Maximum Drawdown (m)
0.106	19.08	7.0	7.7

3.2 Assessment of Groundwater Take During Operational Phase

Based on the discussion with the Client, a drained basement using sub-soil drainage and a sump-and-pump system will be adopted as the design for the proposed development. The estimated volume of groundwater to be removed during the operational phase of development is expected to be identical to the groundwater take value during construction phase, i.e. 7.0 ML per year.

3.3 Groundwater Drawdown Induced Settlement

EI utilised PLAXIS 2D to estimate the potential drawdown-induced settlements as a result of dewatering. The maximum predicted groundwater drawdown and its associated maximum ground settlement surrounding the basement boundary are anticipated to be 7.7 m and 5.0 mm, respectively. It should be noted that the predicted settlement accounts only for water drawdown and does not consider other factors, such as shoring wall deflection, surcharge loading, and other construction-related influences. Figures illustrating the estimated drawdown-induced settlement are provided in **Appendix A**. The dewatering drawdown contour plan beyond the basement footprint is presented in **Figure 2**.

Based on the estimated settlements, the ground outside the shoring wall is expected to experience a maximum settlement of up to 5.0 mm. This level of settlement is considered to pose a 'negligible' risk in terms of the category of damage risk due to dewatering, as defined by Cashman and Preene (2021), as shown in the excerpt in **Plate 1**.

Risk category[a]	*Maximum settlement (mm)*[b]	*Building tilt*[c]	*Anticipated effects*
Negligible	<10	<1/500	Superficial damage unlikely
Slight	10–50	1/500–1/200	Possible superficial damage; unlikely to have structural significance
Moderate	50–75	1/200–1/50	Expected superficial damage and possible structural damage to buildings; possible damage to rigid pipelines
Severe	75	>1/50	Expected structural damage to buildings and expected damage to rigid pipelines or possible damage to other pipelines

Source: Preene, M., *Proceedings of the Institution of Civil Engineers—Geotechnical Engineering*, 143(4), 177–190, 2000. With permission.

[a] The risk category is to be based on the more severe of the settlement or tilt criteria.
[b] Maximum settlement is based on the nearest edge of the structure to the groundwater control system.
[c] Tilt is based on rigid body rotation, assuming that all of the maximum settlement occurs as differential settlement across the width of the structure or across an element of the structure.

Plate 1 **Excerpt from Cashman and Preene (2021)**

Although the PLAXIS modelling provides predicted drawdown-induced ground settlement values, it would be prudent for a thorough assessment of potential risks posed on neighbouring structures to be completed by a qualified and experienced structural engineer.

4 CONCLUSIONS AND COMMENTS

Based on the findings of this report and within the limitations of available data, EI concludes that:

- Construction phase groundwater take will be approximately 7.0 ML per year for the proposed development.
- The above estimate is based on the following assumptions:
  - The shoring wall system is a permeable system as per **Section 2.4** of this report;
  - Continuous dewatering in order to maintain the groundwater at BEL during construction; and
  - This assessment does not take into consideration any excavation that may be required for footings, service trenches, lift pits, or crane pads. This additional excavation, if required, is not expected to affect the retention or the dewatering system.
- The operational phase groundwater take with a drained basement system is estimated to be identical to the construction groundwater take, i.e. 7.0 ML per year.
- The groundwater drawdown surrounding the basement boundary is predicted to be up to 7.7 m.
- The ground settlements due to the predicted groundwater drawdown behind the shoring wall, within the 20 m radius cone of depression, are estimated to be less than 5.0 mm. This level of settlement falls within the 'negligible' risk category for damage risk resulting from ground settlement due to dewatering, as per Cashman and Preene (2021). It would be prudent for potential risks to neighbouring structures to be assessed by a qualified and experienced structural engineer.
- Should any design or construction conditions differ from that adopted in this report; this GSA should be reviewed and updated as required.

5 LIMITATIONS

This report has been prepared for the exclusive use of Hyecorp who is the only intended beneficiary of EI's work. The scope of the inspections carried out for the purpose of this report is limited to those agreed with Hyecorp.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

EI has used a degree of care and skill ordinarily exercised in similar tasks by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited assessment of conditions, with specific locations chosen to be as representative as possible under the given circumstances.

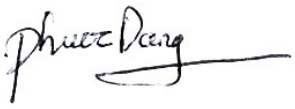
EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

6 CLOSURE

Please do not hesitate to contact the undersigned should you have any questions.

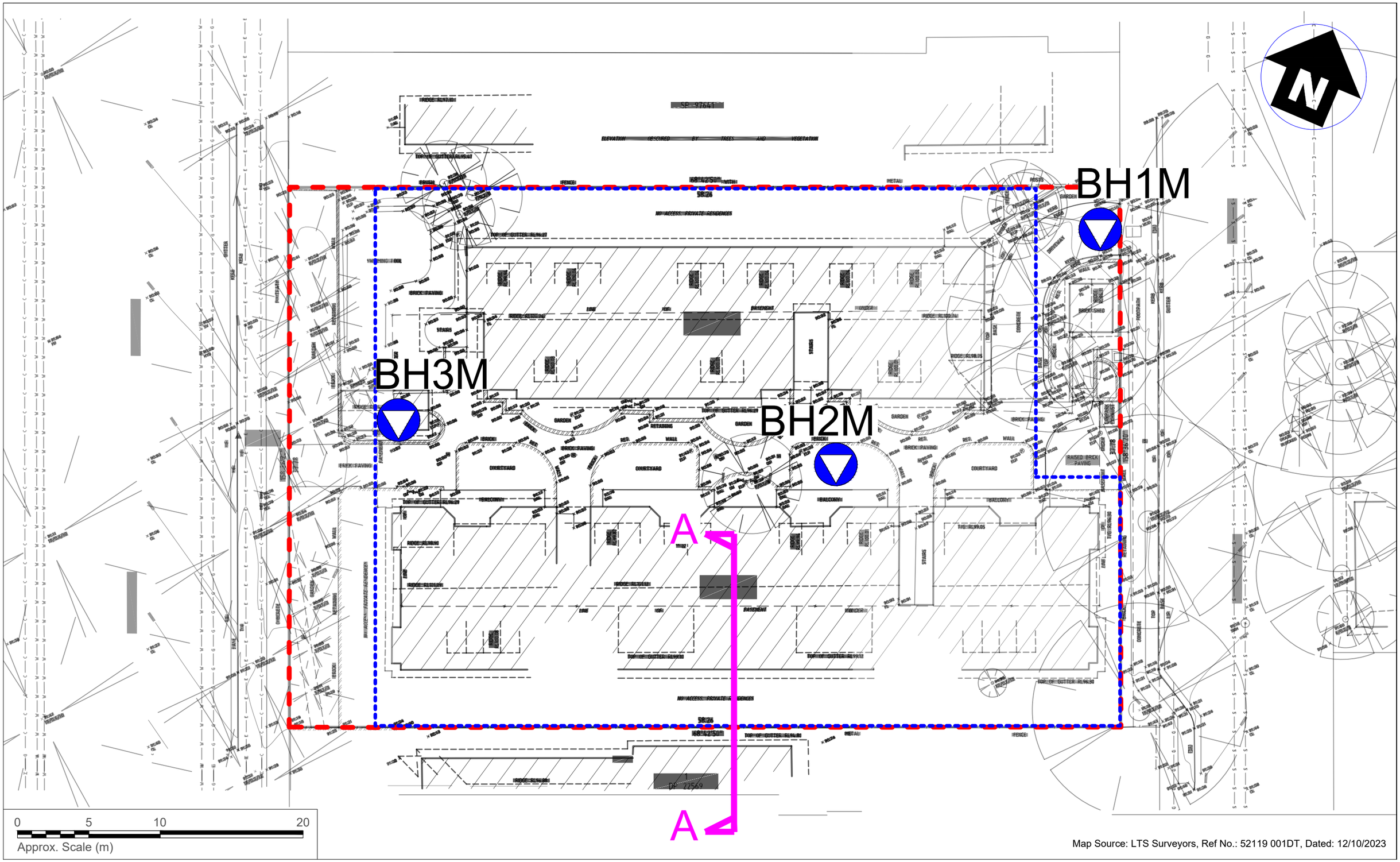
For and on behalf of
EI Australia

Author	Technical Reviewer
	
Ernest Widjaja Geotechnical Engineer	Huu Dang Principal Design Engineer

Attachments:
Figure 1 – Analysed Section Plan
Figure 2 – Dewatering Drawdown Contour Plan
Appendix A – PLAXIS 2D Model and Results
Appendix B – Pump Out Tests
Appendix C – Groundwater Level Monitoring Report No. 1
Appendix D – Important Information

eiaustralia

Figures



Map Source: LTS Surveyors, Ref No.: 52119 001DT, Dated: 12/10/2023

LEGEND (All Locations are Approximate)

- Site Boundary
- Basement Boundary
- Analysed PLAXIS Section
- Borehole Location with Monitoring Well

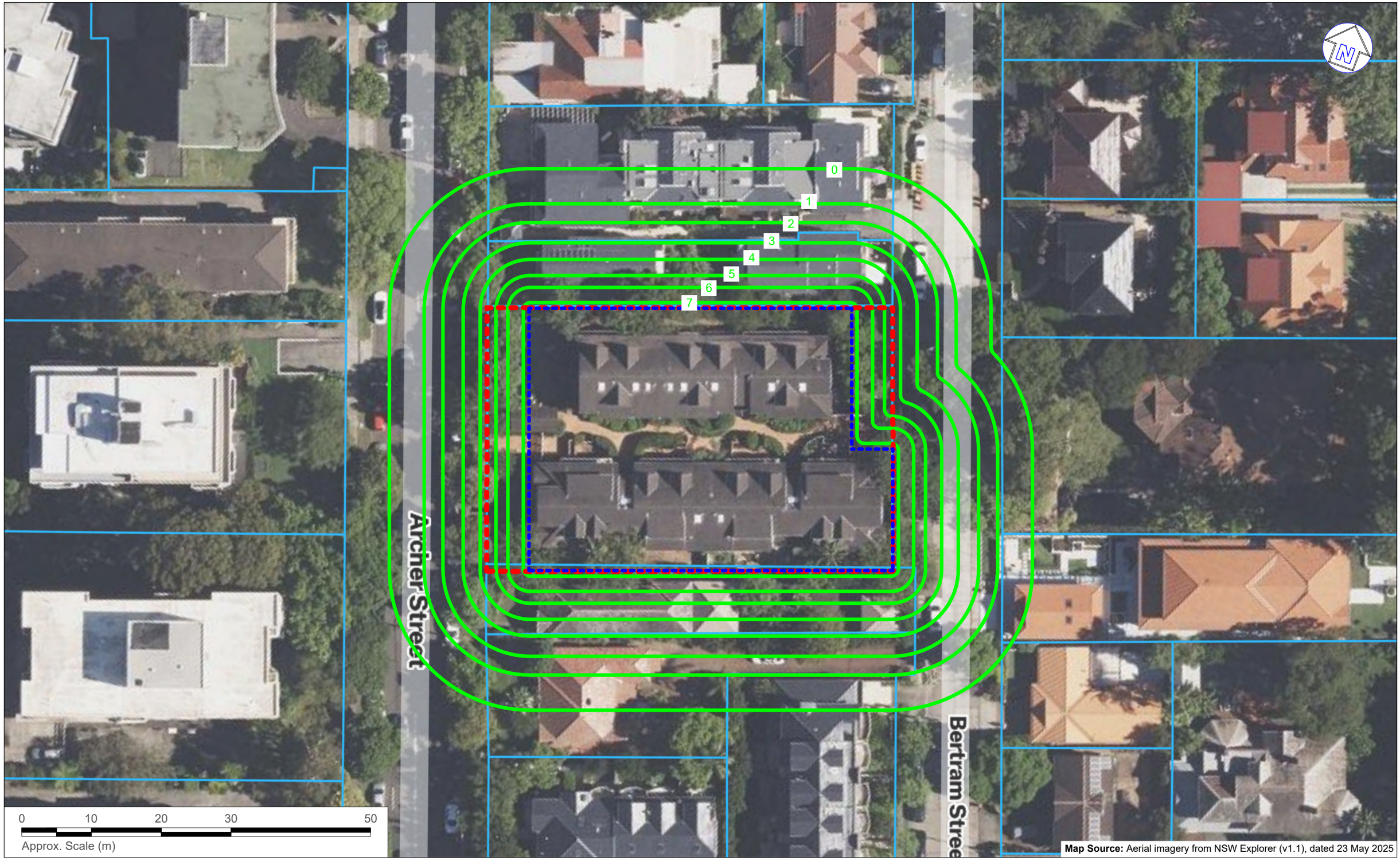
eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	E.W.
Approved:	H.D.
Date:	8/5/25

Hyecorp
Groundwater Seepage Analysis
37 Archer Street, Chatswood, NSW
Analysed Section Plan

Figure: 1

Project: E26577.G12



LEGEND

- Site boundary
- Basement boundary
- Predicted drawdown contour (m)

eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

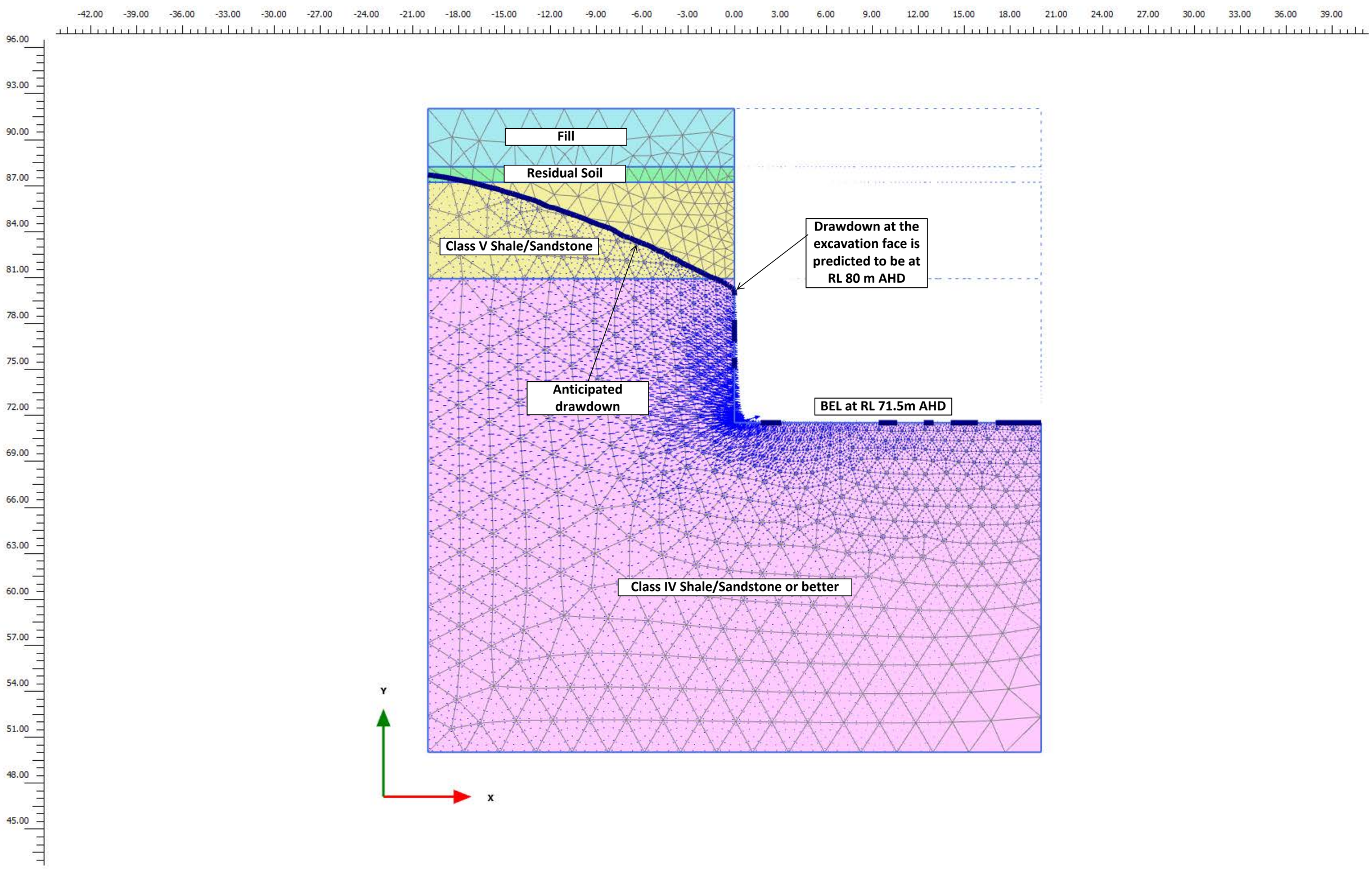
Drawn:	E.W.
Approved:	H.D.
Date:	23/5/25

Hyecorp
Groundwater Seepage Analysis
37 Archer Street, Chatswood, NSW
Dewatering Drawdown Contour Plan

Figure: 2

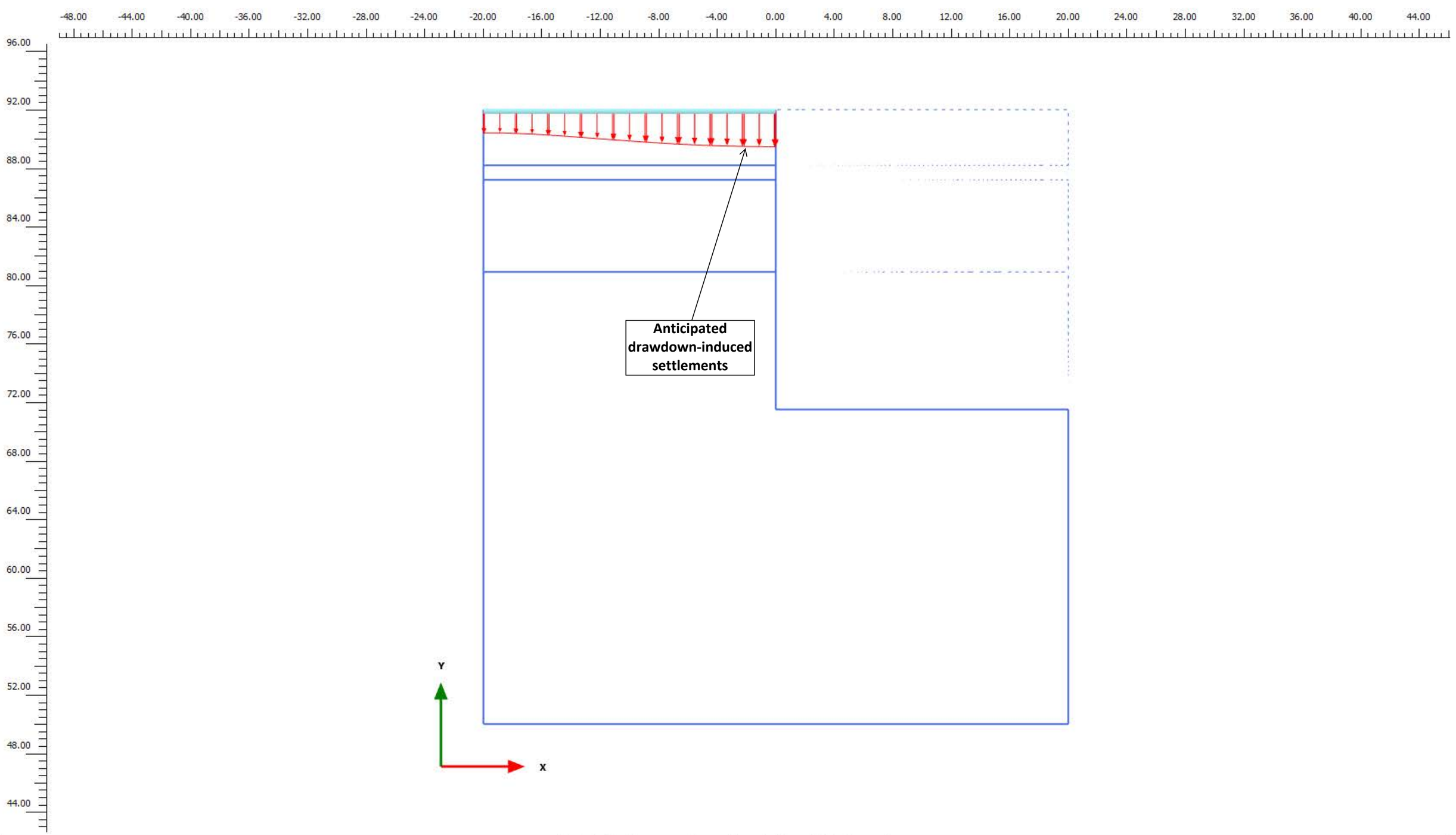
Project: E26577.G12_Rev1

Appendix A – PLAXIS 2D Model and Results



PLAXIS 2D

Project description		Date
Groundwater Flow for Section A-A		23/05/2025
Project filename	**Step**	**Company**
E26577.G12_Rev1_Section A-A	2	EI Australia



Total displacements u_y (scaled up 500 times)

Maximum value = $-2.968*10^{-3}$ m

Minimum value = $-4.867*10^{-3}$ m

PLAXIS® 2D	*Project description* Drawdown-Induced Settlements beyond the Shoring Wall		*Date* 23/05/2025
	Project filename E26577.G12_Rev1_Section A-A	*Step* 2	*Company* El Australia

Appendix B – Pump Out Tests

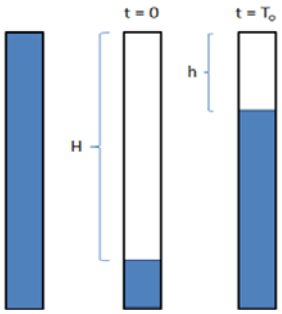
Pump-Out Test Results & Permeability Calculation

Well ID: BH1M

EI Job Number	E26577.G12	Test Date	22/01/2025
Test By	S2	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.1
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	18.26
Static Water Level (m BToC)	4.58
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	9933

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**2.65E-08**



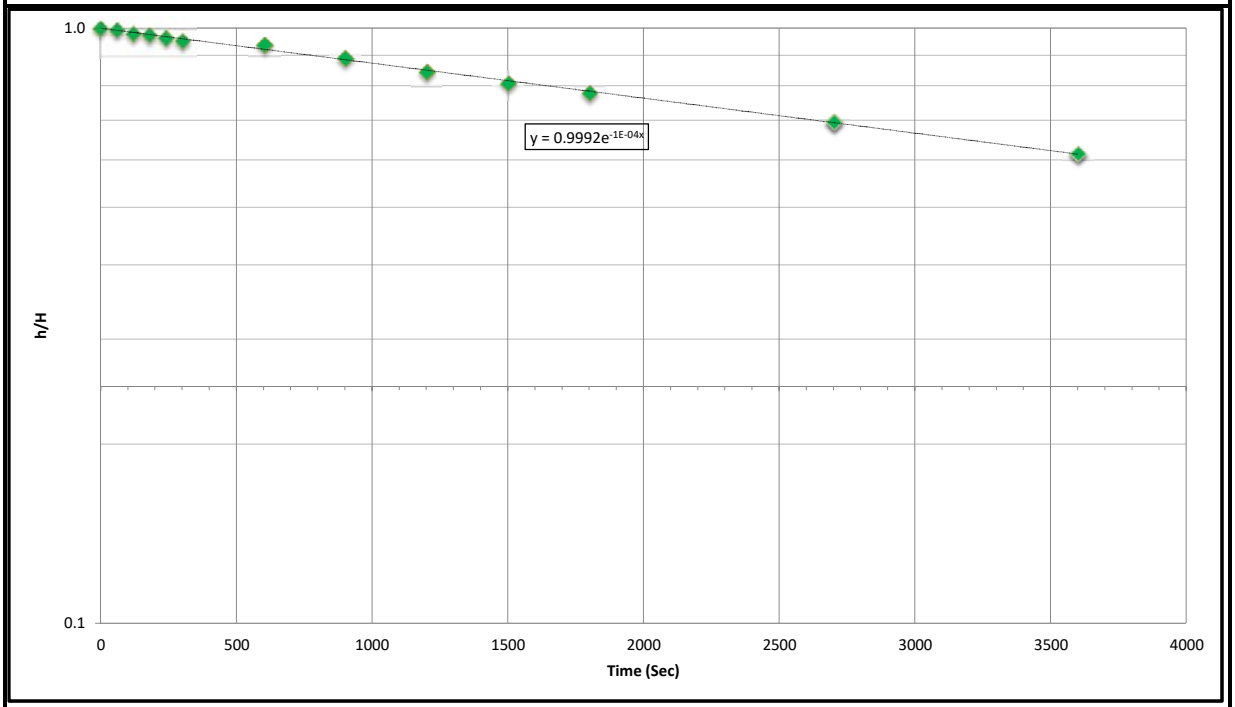
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right) \left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		4.58		
0 (after pumpout, start of test	0	16.18	11.60	1.0000
1	60	16.10	11.52	0.9931
2	120	15.95	11.37	0.9802
3	180	15.90	11.32	0.9759
4	240	15.77	11.19	0.9647
5	300	15.65	11.07	0.9543
10	600	15.45	10.87	0.9371
15	900	14.90	10.32	0.8897
20	1200	14.37	9.79	0.8440
25	1500	13.95	9.37	0.8078
30	1800	13.62	9.04	0.7793
45	2700	12.65	8.07	0.6957
60	3600	11.72	7.14	0.6155



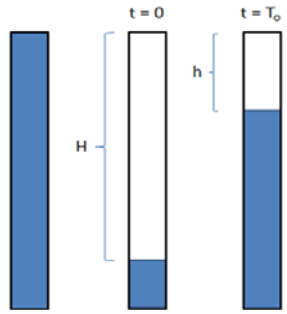
Pump-Out Test Results & Permeability Calculation

Well ID: BH1M

EI Job Number	E26577.G12	Test Date	22/04/2025
Test By	JO	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.1
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	18.26
Static Water Level (m BToC)	4.51
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	9723

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**2.71E-08**



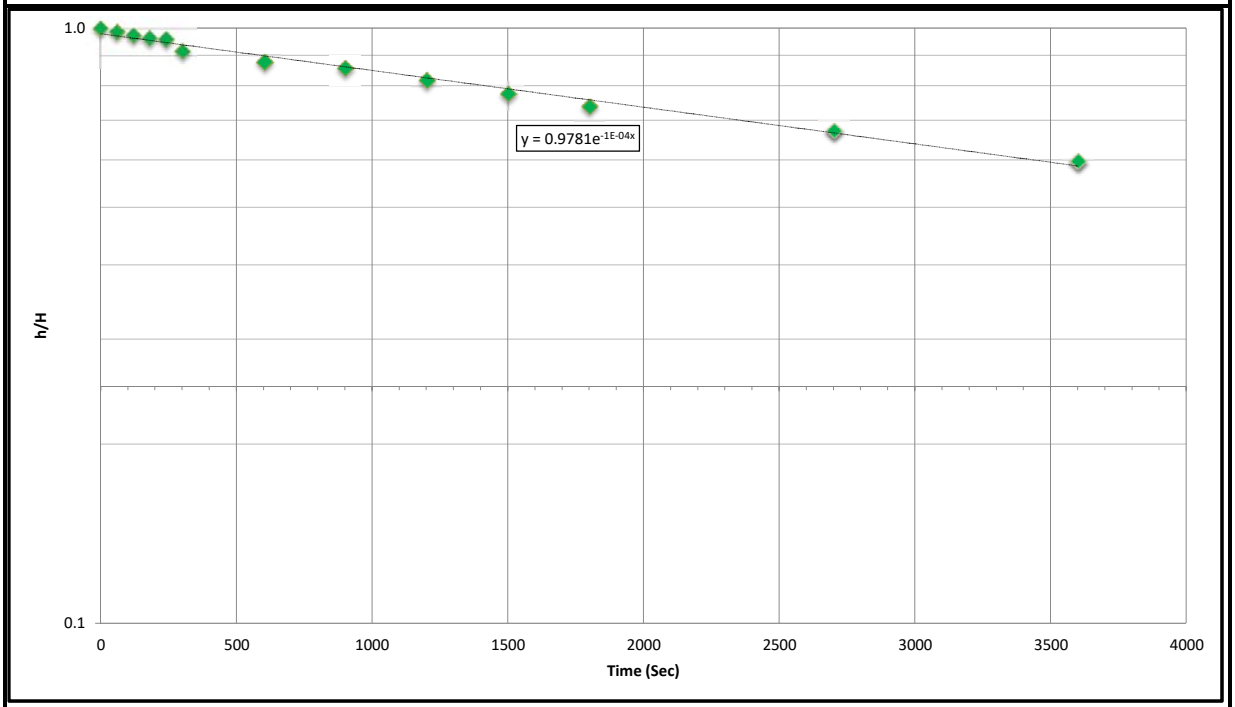
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		4.51		
0 (after pumpout, start of test	0	17.38	12.87	1.0000
1	60	17.20	12.69	0.9860
2	120	17.03	12.52	0.9728
3	180	16.90	12.39	0.9627
4	240	16.84	12.33	0.9580
5	300	16.29	11.78	0.9153
10	600	15.79	11.28	0.8765
15	900	15.54	11.03	0.8570
20	1200	15.03	10.52	0.8174
25	1500	14.50	9.99	0.7762
30	1800	14.02	9.51	0.7389
45	2700	13.18	8.67	0.6737
60	3600	12.21	7.70	0.5983



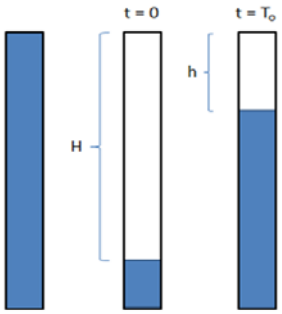
Pump-Out Test Results & Permeability Calculation

Well ID: BH2M

EI Job Number	E26577.G12	Test Date	22/01/2025
Test By	S2	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.07
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	18
Static Water Level (m BToC)	1.5
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	3421

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**7.71E-08**



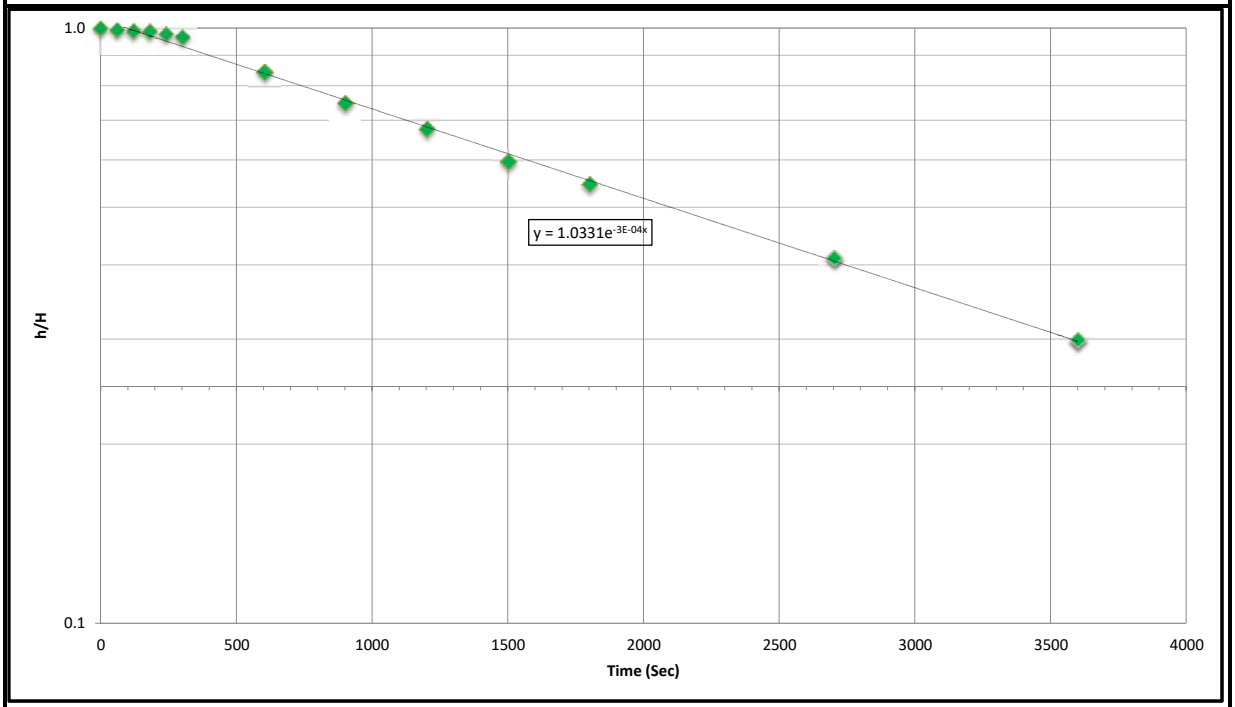
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		1.50		
0 (after pumpout, start of test	0	13.52	12.02	1.0000
1	60	13.45	11.95	0.9942
2	120	13.40	11.90	0.9900
3	180	13.38	11.88	0.9884
4	240	13.26	11.76	0.9784
5	300	13.12	11.62	0.9667
10	600	11.64	10.14	0.8436
15	900	10.52	9.02	0.7504
20	1200	9.65	8.15	0.6780
25	1500	8.68	7.18	0.5973
30	1800	8.08	6.58	0.5474
45	2700	6.45	4.95	0.4118
60	3600	5.10	3.60	0.2995



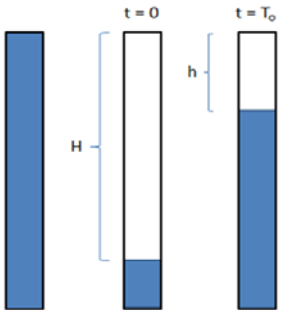
Pump-Out Test Results & Permeability Calculation

Well ID: BH2M

EI Job Number	E26577.G12	Test Date	29/04/2025
Test By	AE	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.07
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	18
Static Water Level (m BToC)	1.4
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	2383

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**1.11E-07**



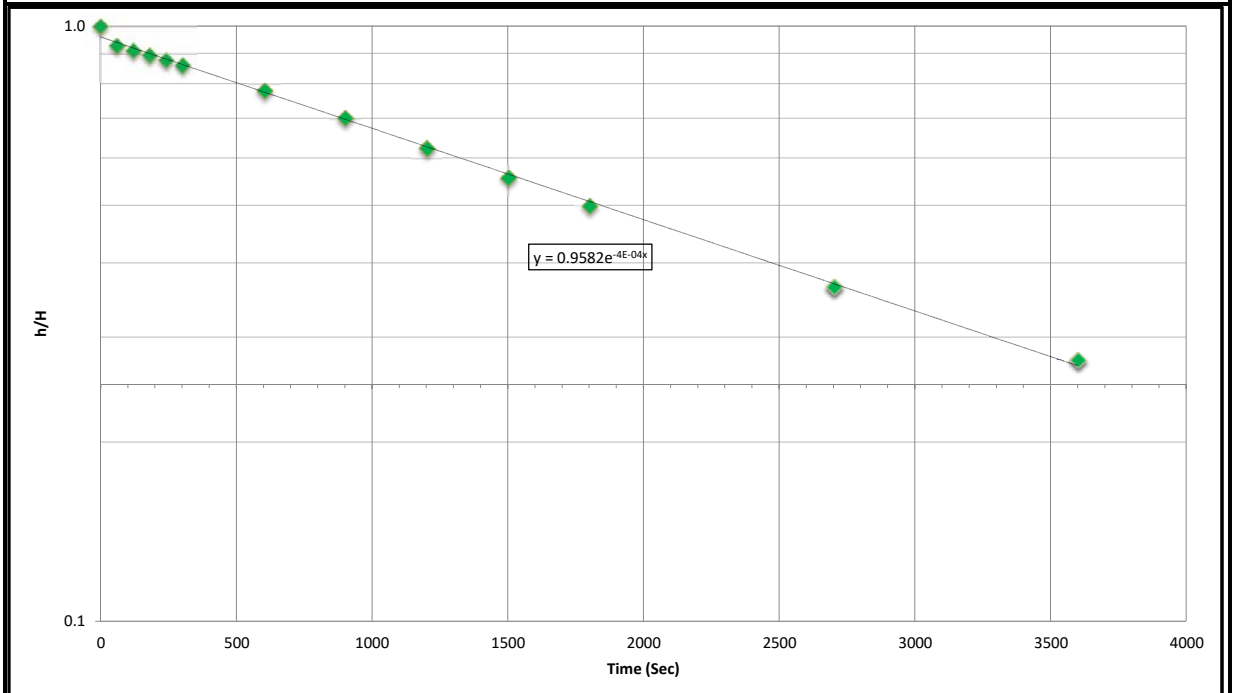
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		1.40		
0 (after pumpout, start of test	0	16.51	15.11	1.0000
1	60	15.42	14.02	0.9279
2	120	15.16	13.76	0.9107
3	180	14.91	13.51	0.8941
4	240	14.66	13.26	0.8776
5	300	14.41	13.01	0.8610
10	600	13.19	11.79	0.7803
15	900	12.00	10.60	0.7015
20	1200	10.81	9.41	0.6228
25	1500	9.81	8.41	0.5566
30	1800	8.94	7.54	0.4990
45	2700	6.91	5.51	0.3647
60	3600	5.56	4.16	0.2753



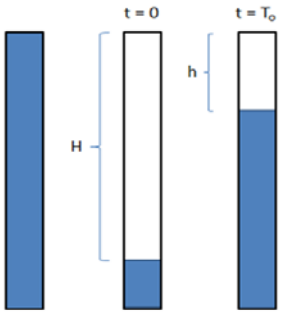
Pump-Out Test Results & Permeability Calculation

Well ID: BH2M

EI Job Number	E26577.G12	Test Date	19/05/2025
Test By	DS	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.07
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	18
Static Water Level (m BToC)	1.25
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	3053

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**8.64E-08**



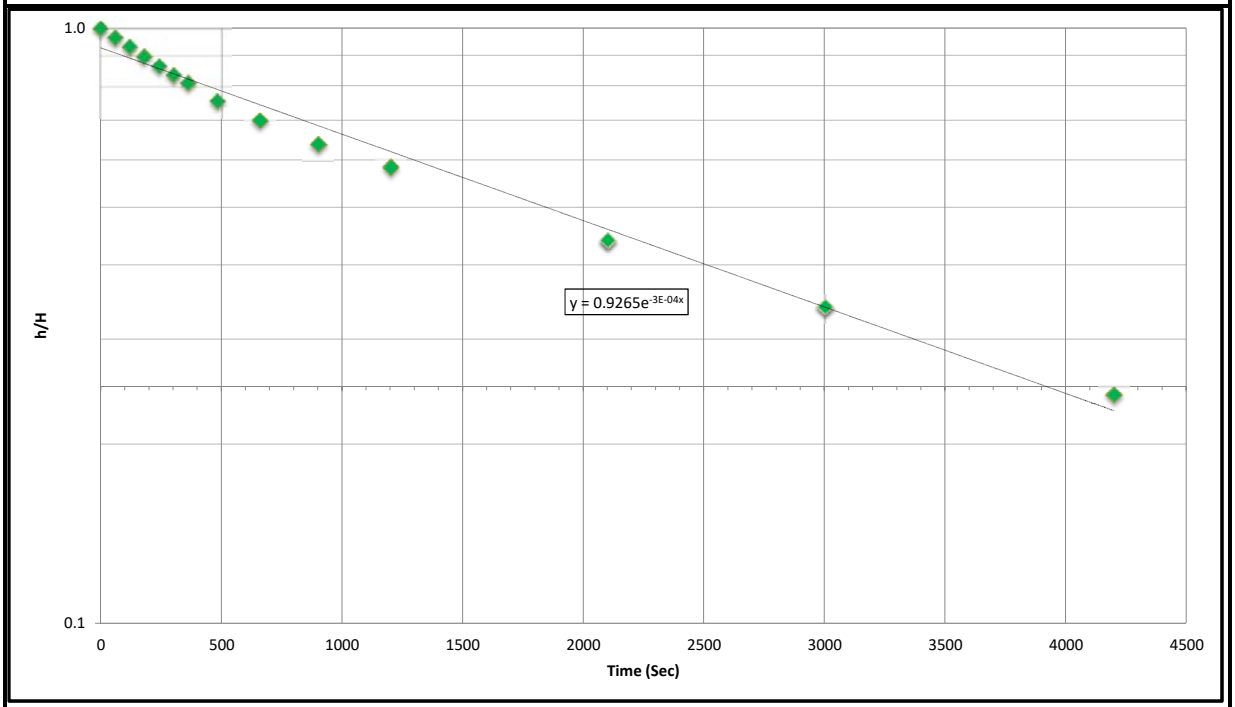
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right) \left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		1.25		
0 (after pumpout, start of test	0	9.38	8.13	1.0000
1	60	9.10	7.85	0.9656
2	120	8.82	7.57	0.9311
3	180	8.55	7.30	0.8979
4	240	8.29	7.04	0.8659
5	300	8.05	6.80	0.8364
6	360	7.84	6.59	0.8106
8	480	7.40	6.15	0.7565
11	660	6.94	5.69	0.6999
15	900	6.45	5.20	0.6396
20	1200	6.00	4.75	0.5843
35	2100	4.83	3.58	0.4403
50	3000	4.02	2.77	0.3407
70	4200	3.22	1.97	0.2423



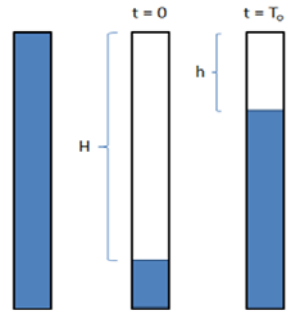
Pump-Out Test Results & Permeability Calculation

Well ID: BH3M

EI Job Number	E26577.G12	Test Date	13/02/2025
Test By	DC	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.09
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	22.1
Static Water Level (m BToC)	9.9
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	11239

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**2.35E-08**



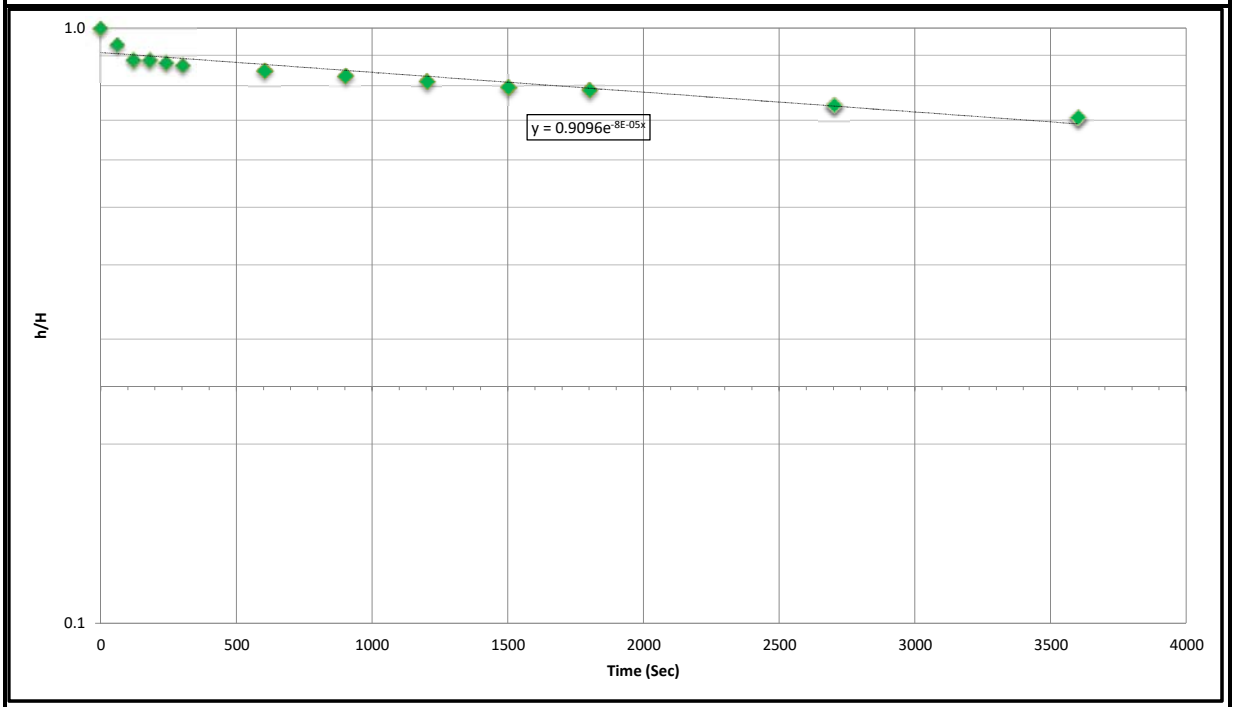
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		9.90		
0 (after pumpout, start of test	0	21.20	11.30	1.0000
1	60	20.50	10.60	0.9381
2	120	19.90	10.00	0.8850
3	180	19.90	10.00	0.8850
4	240	19.80	9.90	0.8761
5	300	19.70	9.80	0.8673
10	600	19.50	9.60	0.8496
15	900	19.30	9.40	0.8319
20	1200	19.10	9.20	0.8142
25	1500	18.90	9.00	0.7965
30	1800	18.80	8.90	0.7876
45	2700	18.30	8.40	0.7434
60	3600	17.90	8.00	0.7080



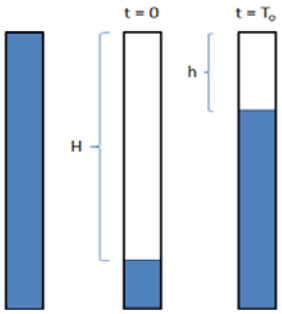
Pump-Out Test Results & Permeability Calculation

Well ID: BH3M

EI Job Number	E26577.G12	Test Date	29/04/2025
Test By	AE	Site Address	37 Archer Street, Chatswood NSW

Casing Stick-up (m)	-0.09
Effective Piezo Screen Length, L (m)	6
Piezo Radius, r (m)	0.025
Borehole Radius, R (m)	0.038
Depth of Piezometer (m BEGL)	22.1
Static Water Level (m BToC)	10.28
Generalised Hvorslev Start Time, t1 (sec)	136709
Generalised Hvorslev End Time, t2 (sec)	187525
Generalised Hvorslev Start h/H value, h1	0.25
Generalised Hvorslev End h/H value, h2	0.15
Hvorslev Lag Time, T_o (sec)	10849

Estimation Method Used	Standard Hvorslev (To)
Estimated Permeability, k (m/sec)	**2.43E-08**



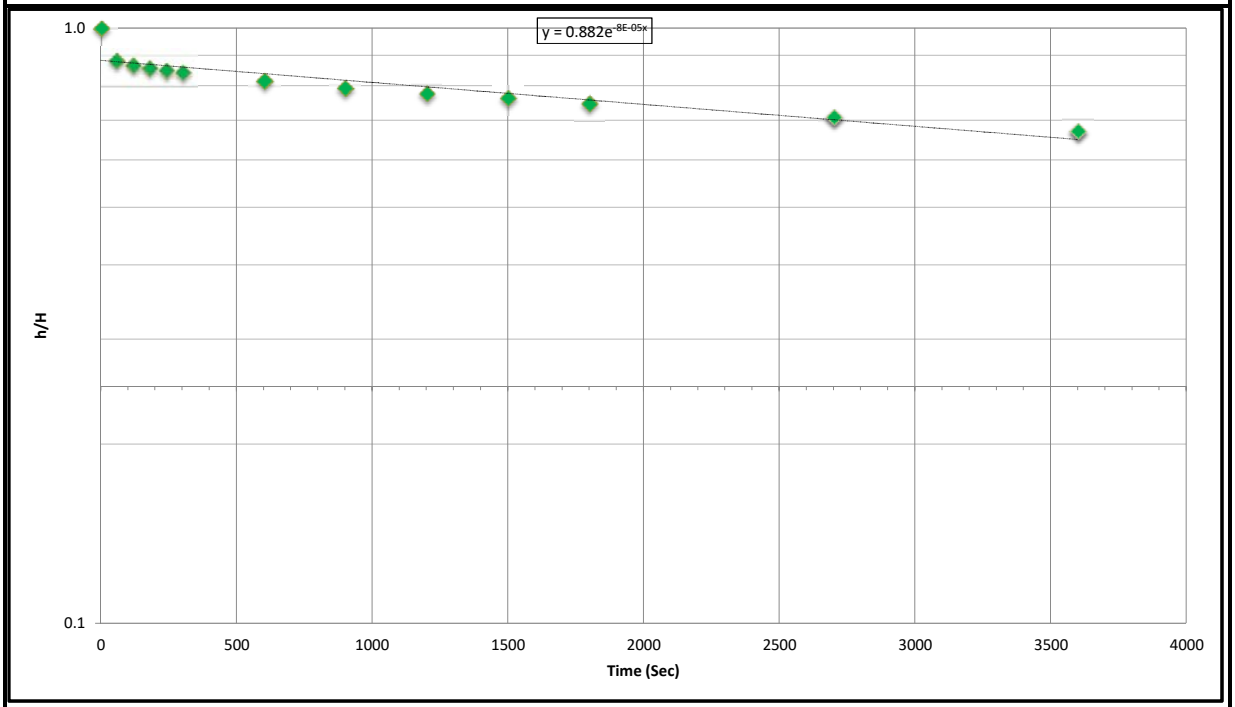
Hvorslev Formula
T_o = t when h/H = 0.37

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

Generalised Hvorslev Formula
From Butler (1996), use h1 = 0.25, h2 = 0.15

$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left(\frac{\ln(h_1/h_2)}{t_2 - t_1}\right)$$

Time (mins)	Time (sec)	Depth to water (m BToC)	Change in Level (m)	h/H
Static (prior to pumpout)		10.28		
0 (after pumpout, start of test	0	20.91	10.63	1.0000
1	60	19.66	9.38	0.8824
2	120	19.50	9.22	0.8674
3	180	19.40	9.12	0.8579
4	240	19.32	9.04	0.8504
5	300	19.25	8.97	0.8438
10	600	18.94	8.66	0.8147
15	900	18.69	8.41	0.7912
20	1200	18.53	8.25	0.7761
25	1500	18.38	8.10	0.7620
30	1800	18.22	7.94	0.7469
45	2700	17.81	7.53	0.7084
60	3600	17.41	7.13	0.6707



Appendix C – Groundwater Level Monitoring Report No.1

Suite 6.01, 55 Miller Street
PYRMONT NSW 2009
www.eiaustralia.com.au
02 9516 0722

23 May 2025
E26577.G11.GW02

Adrian Giardina
HPG General Pty Ltd
256 Victoria Road
CHATSWOOD AUSTRALIA NSW 2067

Groundwater Level Monitoring Report No. 2
37 Archer Street, Chatswood NSW, Australia

EI Australia (EI) has been engaged to prepare this factual letter report to provide continual groundwater levels at the above site. The monitoring period in this report is from Monday 10 February 2025 to Monday 19 May 2025.

Groundwater levels were collected remotely during the monitoring period using data loggers installed within monitoring wells. The data logger / monitoring well details and the groundwater levels observed during the monitoring period are summarised in Table 1 & 2 below.

Table 1 Summary of Data Logger & Well Installation Details

Monitoring Well ID	Top of Well RL (mAHD)	Existing Ground RL (mAHD)	Well Stickup (m)	Well Depth Below Ground (m) [1]	Sensor RL (mAHD)
BH1M	90.30	90.40	-0.10	18.26	73.10
BH2M	87.93	88.00	-0.07	18.00	71.13
BH3M	90.81	90.90	-0.09	21.20	69.81

Note 1: The level of the bottom of the well is based on manual measurements after the well installation. The measurement accounts for any variation of the well depth caused by infilling of material through the well screen.
Note 2: The data logger installed within BH2M was noted to be lost upon planned retrieval on 22 April 2025

Table 2 Summary of Groundwater Levels

Monitoring Well ID	Average Groundwater RL (mAHD)	Highest Groundwater RL (mAHD)	Lowest Groundwater RL (mAHD)	Highest Groundwater Depth (m Below Ground)	Lowest Groundwater Depth (m Below Ground)
BH1M	85.87	86.06	85.69	4.34	4.71
BH2M	86.55 [2]	86.69 [3]	86.43 [3]	1.31	1.57
BH3M	80.56	81.03	80.44	9.87	10.46

Note 2: The average groundwater RL has been taken as an approximate average of the manual groundwater dips recorded and data logger readings
Note 3: Highest and Lowest groundwater RLs & depths have not been noted due to the relatively consistent groundwater levels from manual dips recorded

Please do not hesitate to contact the undersigned should you have any questions.

For and on behalf of:
EI AUSTRALIA

Author

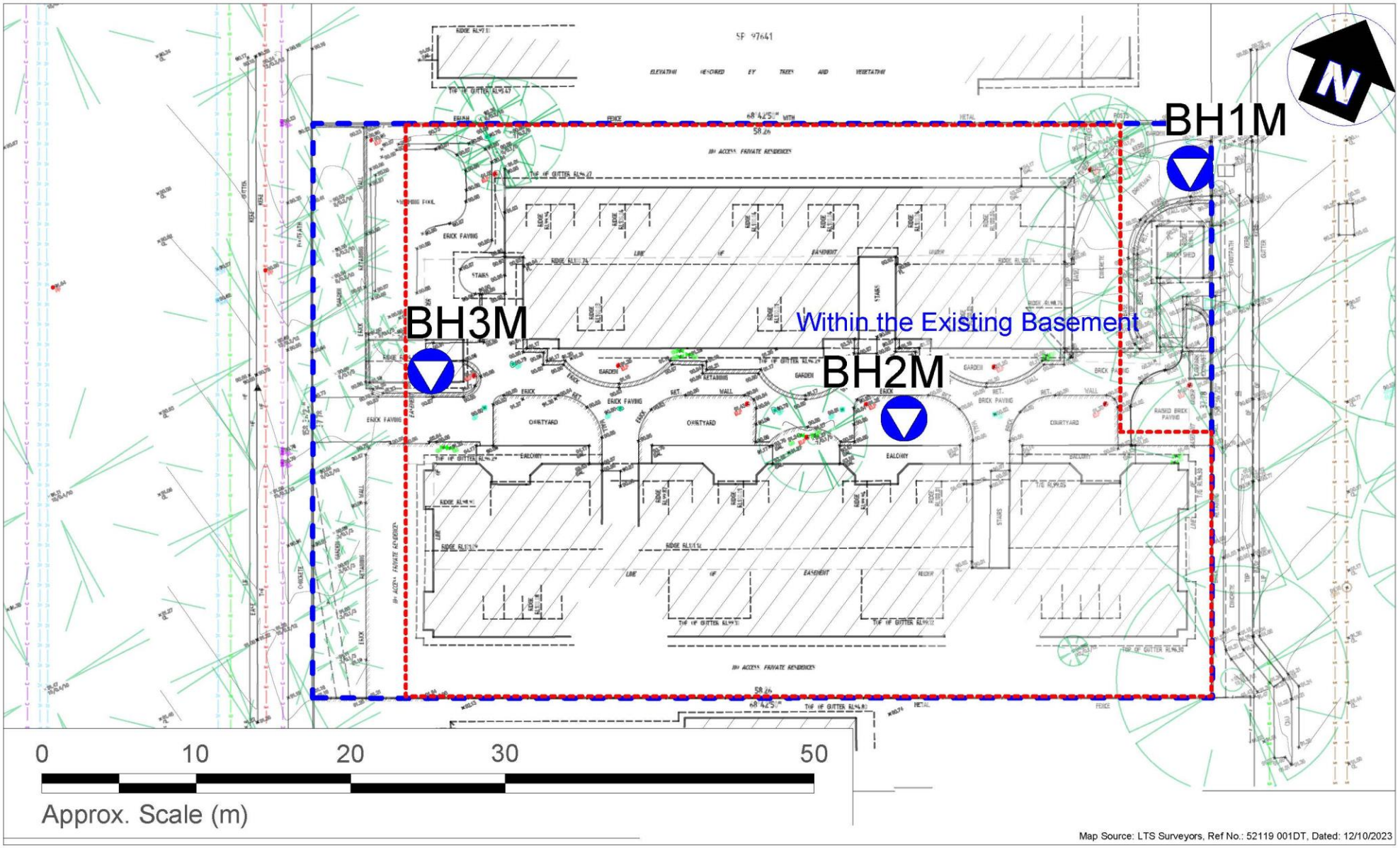
Anthony Esper
Undergraduate Geotechnical Engineer

Reviewer

James Brooker
Senior Geotechnical Engineer

Attachments:

Figure 1: Data Logger Location Plan
Figure 2-4: Groundwater Level, Daily Rainfall vs. Time From 10 February 2025 to 19 May 2025
Important Information



LEGEND (All Locations are Approximate)

- Site Boundary
- Borehole Location with Monitoring Well

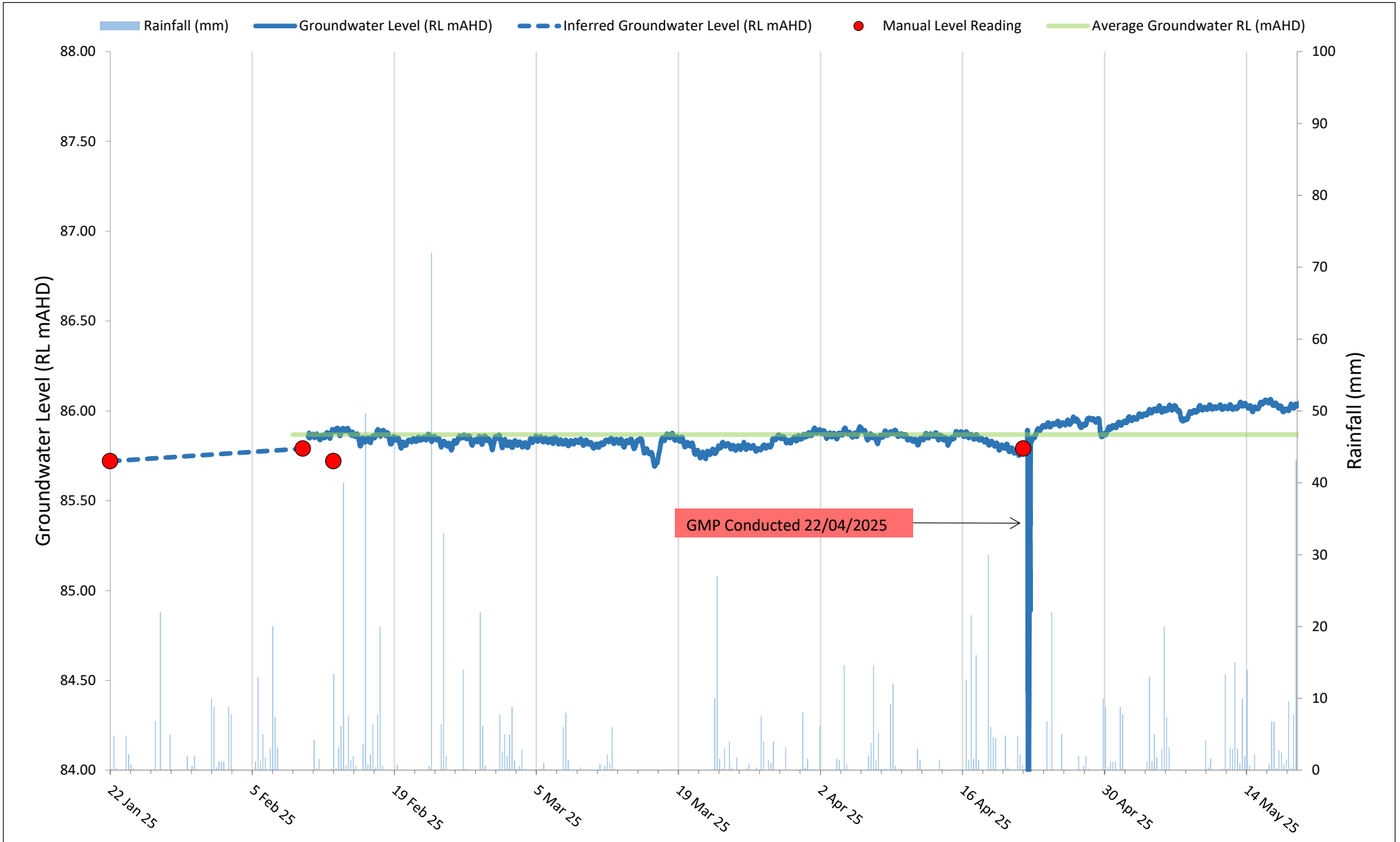
eiaustralia
Practical Solutions for Built Environments
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	A.E
Approved:	J.B
Date:	01/05/2025

Hyecorp Property Group
Geotechical Investigation
No.37 Archer Street, Chatswood
Monitoring Well Location

Figure: 1

Project: E26577.G11



eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph. (02) 9516 0722 Fax (02) 9518 5088

Drawn:	AE
Approved:	JB
Date:	23/05/2025

HPG General Pty Ltd

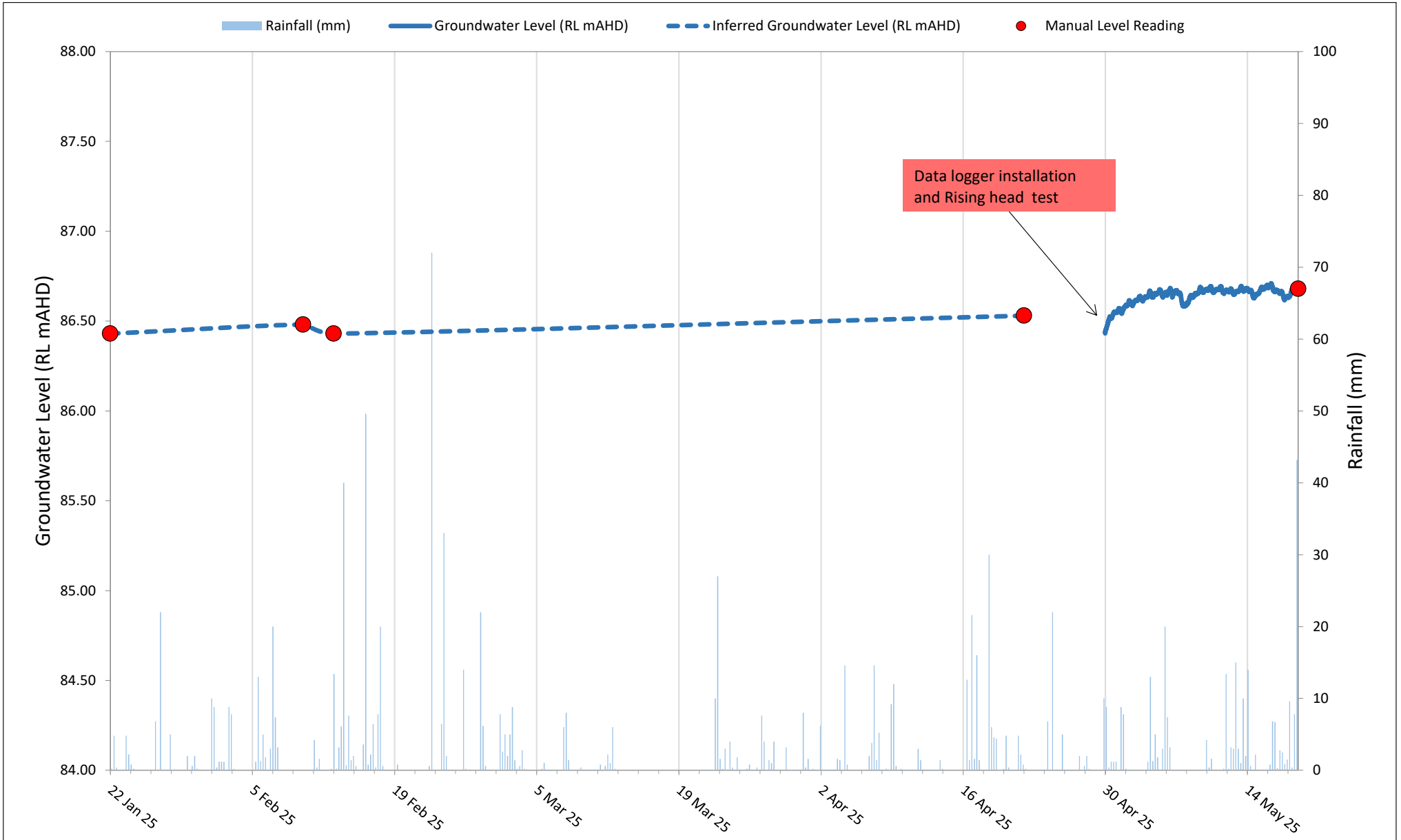
Groundwater Level Monitoring

37 Archer Street, Chatswood NSW, Australia

BH1M

Figure: **2**

Project: E26577.G11.GW02



eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph. (02) 9516 0722 Fax (02) 9518 5088

Drawn:	AE
Approved:	JB
Date:	23/05/2025

HPG General Pty Ltd

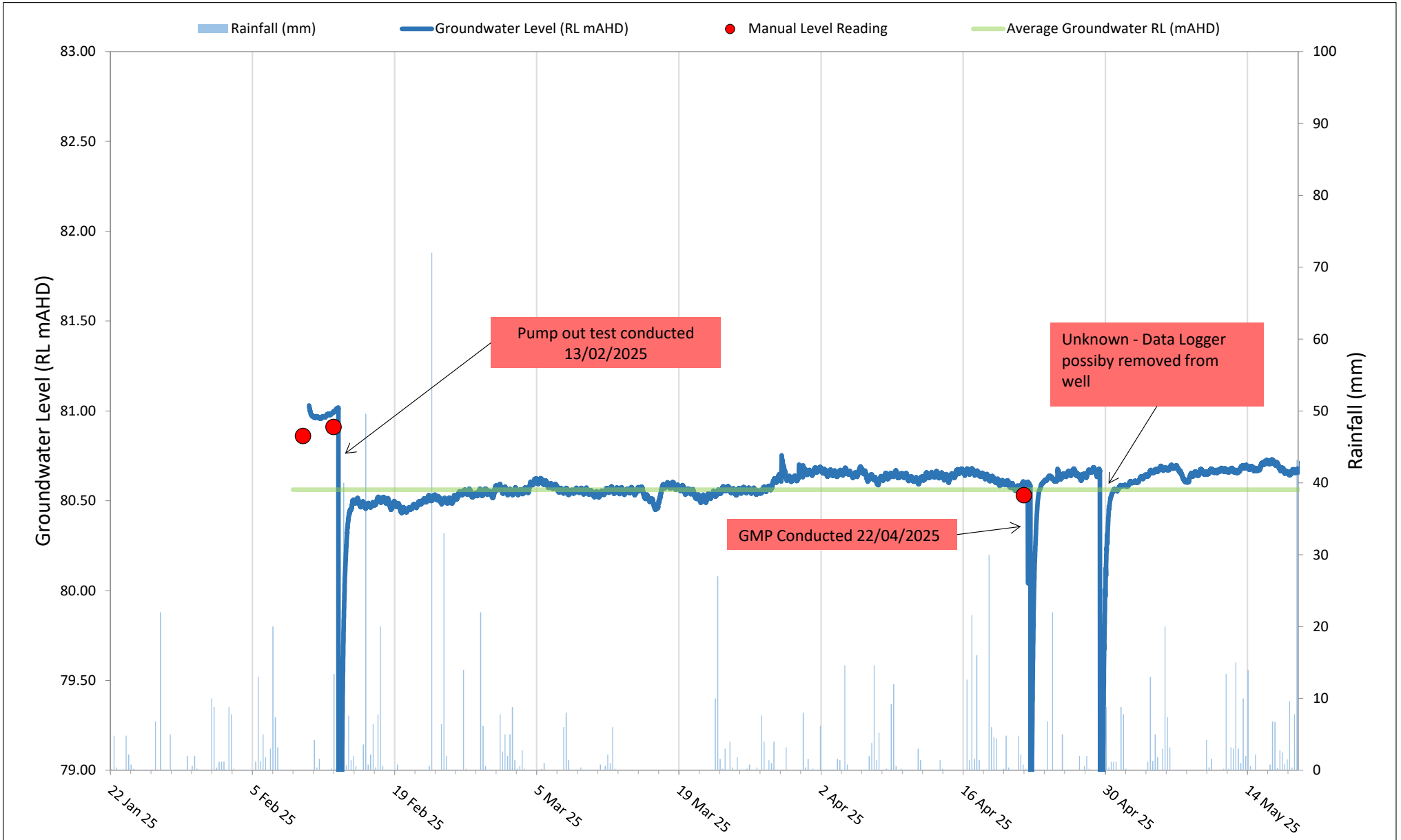
Groundwater Level Monitoring

37 Archer Street, Chatswood NSW, Australia

BH2M

Figure: **3**

Project: E26577.G11.GW02



eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph. (02) 9516 0722 Fax (02) 9518 5088

Drawn:	AE
Approved:	JB
Date:	23/05/2025

HPG General Pty Ltd

Groundwater Level Monitoring

37 Archer Street, Chatswood NSW, Australia

BH3M

Figure: **4**

Project: E26577.G11.GW02

Appendix D – Important Information

Important Information

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client And EI Australia ("EI"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

EI has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. EI has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, EI will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to EI.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies. The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. EI should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that EI be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. EI assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of EI or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

EI will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.

Appendix E – Registered Bore Search

Appendix F – Borehole Logs

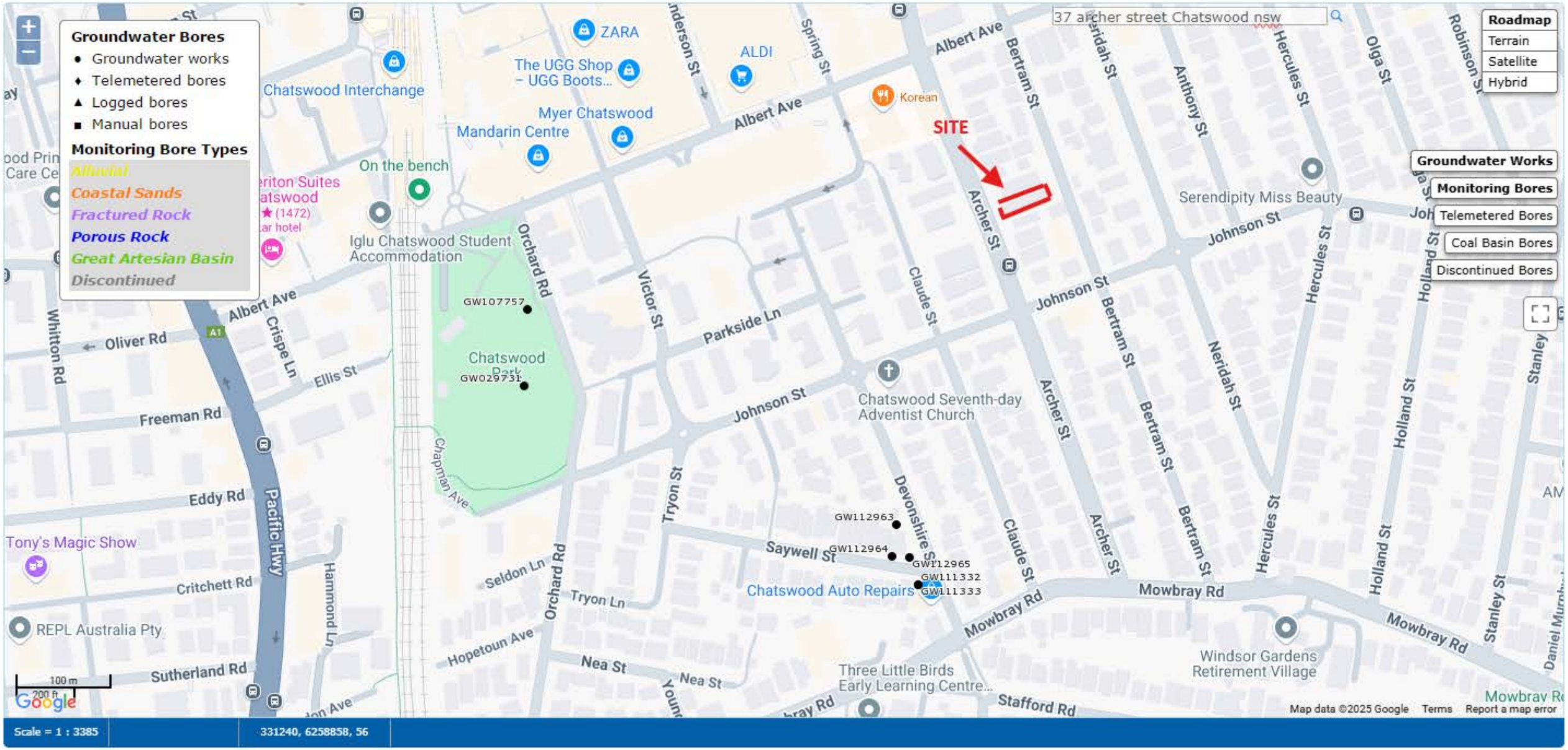
All Groundwater Site Details

ALL GROUNDWATER MAP

bookmark this page

All data times are Eastern Standard Time

Map | Info



Scale = 1 : 3385

331240, 6258858, 56

State Overview
State Overview

Rivers and Streams
favourites | search | download sites | find a site
Real Time Data - Rivers And Streams

Daily River Reports
Daily River Reports

Dams
favourites | search | download sites | find a site
Real Time Data - Major Dams

Groundwater (Telemetered data)
favourites | search | download sites | find a site
Real Time Data - Bores

All Groundwater Site details
search | download sites | find a site
search by licence
All Groundwater Map

Meteorology
favourites | search | download sites | find a site
Real Time Data - Weather Stations

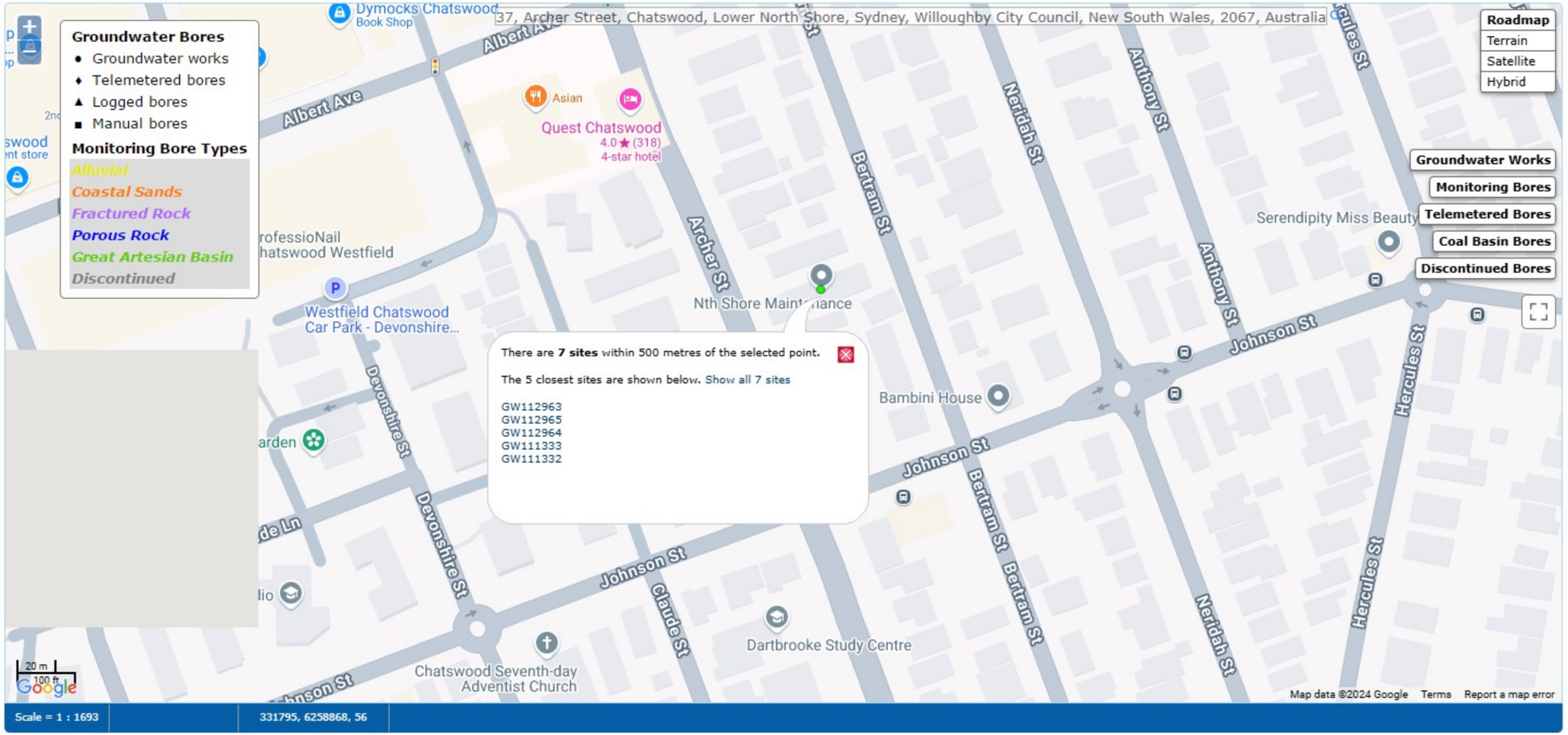
Hunter River Salinity Trading Scheme
Hunter River Salinity Trading Scheme

ALL GROUNDWATER MAP

bookmark this page

All data times are Eastern Standard Time

Map | Info



Scale = 1 : 1693 | 331795, 6258868, 56

Appendix G – Laboratory Certificates and Analytical Reports

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Alejandra Beltran
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	alejandra.beltran@eiaustralia.com.au
Project	**E26577, 37 Archer St. Chatswood NSW**
Order Number	**E26577**
Samples	7

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE281816 R0**
Date Received	23/4/2025
Date Reported	2/5/2025

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Anions Ion Chromatography - The Limit of Reporting (LOR) has been raised due to high conductivity of the sample requiring dilution.

SIGNATORIES

Akheeqar BENIAMEEN
Chemist

Dong LIANG
Metals/Inorganics Team Leader

Kamrul AHSAN
Senior Chemist

Ly Kim HA
Organic Section Head

Shane MCDERMOTT
Laboratory Manager

VOCs in Water [AN433] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	TB1 WATER - 22/4/2025 SE281816.005
Benzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	0.5	<0.5	1.4	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m/p-xylene	µg/L	1	<1	<1	<1	<1	<1
o-xylene	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene (VOC)*	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5	<1.5	<1.5	<1.5	<1.5
Total BTEX	µg/L	3	<3	<3	<3	<3	<3
Dichlorodifluoromethane (CFC-12)	µg/L	5	<5	<5	<5	-	-
Chloromethane	µg/L	5	<5	<5	<5	-	-
Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3	<0.3	<0.3	-	-
Bromomethane	µg/L	10	<10	<10	<10	-	-
Chloroethane	µg/L	5	<5	<5	<5	-	-
Trichlorofluoromethane	µg/L	1	<1	<1	<1	-	-
Acetone (2-propanone)	µg/L	10	<10	<10	<10	-	-
Iodomethane	µg/L	5	<5	<5	<5	-	-
1,1-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Acrylonitrile	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Dichloromethane (Methylene chloride)	µg/L	5	<5	<5	<5	-	-
Allyl chloride	µg/L	2	<2	<2	<2	-	-
Carbon disulfide	µg/L	2	<2	<2	<2	-	-
trans-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1-dichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Vinyl acetate*	µg/L	10	<10	<10	<10	-	-
MEK (2-butanone)	µg/L	10	<10	<10	<10	-	-
cis-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Bromochloromethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Chloroform (THM)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
2,2-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2-dichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1,1-trichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Carbon tetrachloride	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Dibromomethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
2-nitropropane	µg/L	100	<100	<100	<100	-	-
Bromodichloromethane (THM)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
MIBK (4-methyl-2-pentanone)	µg/L	5	<5	<5	<5	-	-
cis-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
trans-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1,2-trichloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,3-dichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Dibromochloromethane (THM)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
2-hexanone (MBK)	µg/L	5	<5	<5	<5	-	-
1,2-dibromoethane (EDB)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Chlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Bromoform (THM)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Styrene (Vinyl benzene)	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2,3-trichloropropane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
trans-1,4-dichloro-2-butene	µg/L	1	<1	<1	<1	-	-
Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	<0.5	<0.5	-	-

VOCs in Water [AN433] Tested: 28/4/2025 (continued)

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	TB1 WATER - 22/4/2025 SE281816.005
Bromobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
n-propylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
2-chlorotoluene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
4-chlorotoluene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,3,5-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
tert-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2,4-trimethylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
sec-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,3-dichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,4-dichlorobenzene	µg/L	0.3	<0.3	<0.3	<0.3	-	-
p-isopropyltoluene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2-dichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
n-butylbenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2,4-trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
Hexachlorobutadiene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
1,2,3-trichlorobenzene	µg/L	0.5	<0.5	<0.5	<0.5	-	-
cis-1,4-dichloro-2-butene	µg/L	1	<1	<1	<1	-	-
Total VOC	µg/L	10	<10	<10	<10	-	-

VOCs in Water [AN433] Tested: 28/4/2025 (continued)

PARAMETER	UOM	LOR	TS1 WATER - 22/4/2025 SE281816.006	GW-QR1 WATER - 22/4/2025 SE281816.007
Benzene	µg/L	0.5	[101%]	<0.5
Toluene	µg/L	0.5	[100%]	<0.5
Ethylbenzene	µg/L	0.5	[100%]	<0.5
m/p-xylene	µg/L	1	[99%]	<1
o-xylene	µg/L	0.5	[100%]	<0.5
Naphthalene (VOC)*	µg/L	0.5	[92%]	<0.5
Total Xylenes	µg/L	1.5	-	<1.5
Total BTEX	µg/L	3	-	<3
Dichlorodifluoromethane (CFC-12)	µg/L	5	-	-
Chloromethane	µg/L	5	-	-
Vinyl chloride (Chloroethene)	µg/L	0.3	-	-
Bromomethane	µg/L	10	-	-
Chloroethane	µg/L	5	-	-
Trichlorofluoromethane	µg/L	1	-	-
Acetone (2-propanone)	µg/L	10	-	-
Iodomethane	µg/L	5	-	-
1,1-dichloroethene	µg/L	0.5	-	-
Acrylonitrile	µg/L	0.5	-	-
Dichloromethane (Methylene chloride)	µg/L	5	-	-
Allyl chloride	µg/L	2	-	-
Carbon disulfide	µg/L	2	-	-
trans-1,2-dichloroethene	µg/L	0.5	-	-
MtBE (Methyl-tert-butyl ether)	µg/L	0.5	-	-
1,1-dichloroethane	µg/L	0.5	-	-
Vinyl acetate*	µg/L	10	-	-
MEK (2-butanone)	µg/L	10	-	-
cis-1,2-dichloroethene	µg/L	0.5	-	-
Bromochloromethane	µg/L	0.5	-	-
Chloroform (THM)	µg/L	0.5	-	-
2,2-dichloropropane	µg/L	0.5	-	-
1,2-dichloroethane	µg/L	0.5	-	-
1,1,1-trichloroethane	µg/L	0.5	-	-
1,1-dichloropropene	µg/L	0.5	-	-
Carbon tetrachloride	µg/L	0.5	-	-
Dibromomethane	µg/L	0.5	-	-
1,2-dichloropropane	µg/L	0.5	-	-
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	-	-
2-nitropropane	µg/L	100	-	-
Bromodichloromethane (THM)	µg/L	0.5	-	-
MIBK (4-methyl-2-pentanone)	µg/L	5	-	-
cis-1,3-dichloropropene	µg/L	0.5	-	-
trans-1,3-dichloropropene	µg/L	0.5	-	-
1,1,2-trichloroethane	µg/L	0.5	-	-
1,3-dichloropropane	µg/L	0.5	-	-
Dibromochloromethane (THM)	µg/L	0.5	-	-
2-hexanone (MBK)	µg/L	5	-	-
1,2-dibromoethane (EDB)	µg/L	0.5	-	-
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	-	-
1,1,1,2-tetrachloroethane	µg/L	0.5	-	-
Chlorobenzene	µg/L	0.5	-	-
Bromoform (THM)	µg/L	0.5	-	-
Styrene (Vinyl benzene)	µg/L	0.5	-	-
1,1,2,2-tetrachloroethane	µg/L	0.5	-	-
1,2,3-trichloropropane	µg/L	0.5	-	-
trans-1,4-dichloro-2-butene	µg/L	1	-	-
Isopropylbenzene (Cumene)	µg/L	0.5	-	-

VOCs in Water [AN433] Tested: 28/4/2025 (continued)

PARAMETER	UOM	LOR	TS1 WATER - 22/4/2025 SE281816.006	GW-QR1 WATER - 22/4/2025 SE281816.007
Bromobenzene	µg/L	0.5	-	-
n-propylbenzene	µg/L	0.5	-	-
2-chlorotoluene	µg/L	0.5	-	-
4-chlorotoluene	µg/L	0.5	-	-
1,3,5-trimethylbenzene	µg/L	0.5	-	-
tert-butylbenzene	µg/L	0.5	-	-
1,2,4-trimethylbenzene	µg/L	0.5	-	-
sec-butylbenzene	µg/L	0.5	-	-
1,3-dichlorobenzene	µg/L	0.5	-	-
1,4-dichlorobenzene	µg/L	0.3	-	-
p-isopropyltoluene	µg/L	0.5	-	-
1,2-dichlorobenzene	µg/L	0.5	-	-
n-butylbenzene	µg/L	0.5	-	-
1,2-dibromo-3-chloropropane	µg/L	0.5	-	-
1,2,4-trichlorobenzene	µg/L	0.5	-	-
Hexachlorobutadiene	µg/L	0.5	-	-
1,2,3-trichlorobenzene	µg/L	0.5	-	-
cis-1,4-dichloro-2-butene	µg/L	1	-	-
Total VOC	µg/L	10	-	-

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	GW-QR1 WATER - 22/4/2025 SE281816.007
TRH C6-C9	µg/L	40	<40	<40	<40	<40	<40
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10	µg/L	50	<50	<50	<50	<50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	GW-QR1 WATER - 22/4/2025 SE281816.007
TRH C10-C14	µg/L	50	**350**	<50	<50	<50	<50
TRH C15-C28	µg/L	200	**290**	<200	<200	<200	<200
TRH C29-C36	µg/L	200	**1000**	<200	<200	<200	<200
TRH C37-C40	µg/L	200	**600**	<200	<200	<200	<200
TRH >C10-C16	µg/L	60	**370**	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	**370**	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	**1000**	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	**870**	<500	<500	<500	<500
TRH C10-C40	µg/L	320	**2300**	<320	<320	<320	<320

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Naphthalene	µg/L	0.1	<0.1	**0.1**	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1
Benzo(b&j&k)fluoranthene	µg/L	0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1	<0.1	<0.1
Total PAH (18)	µg/L	1	-	<1	<1

OC Pesticides in Water [AN420] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Alpha BHC	µg/L	0.1	<0.1
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
Beta BHC	µg/L	0.1	<0.1
Lindane (gamma BHC)	µg/L	0.1	<0.1
Delta BHC	µg/L	0.1	<0.1
Heptachlor	µg/L	0.1	<0.1
Aldrin	µg/L	0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1
Gamma Chlordane	µg/L	0.1	<0.1
Alpha Chlordane	µg/L	0.1	<0.1
Alpha Endosulfan	µg/L	0.1	<0.1
p,p'-DDE	µg/L	0.1	<0.1
Dieldrin	µg/L	0.1	<0.1
Endrin	µg/L	0.1	<0.1
Beta Endosulfan	µg/L	0.1	<0.1
p,p'-DDD	µg/L	0.1	<0.1
Endrin aldehyde	µg/L	0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1
p,p'-DDT	µg/L	0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1
Mirex	µg/L	0.1	<0.1
Total OC	µg/L	1	<1
Total OC	µg/L	1	<1
Total Other OC VIC EPA	µg/L	1	<1

OP Pesticides in Water [AN420] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Azinphos-methyl	µg/L	0.2	<0.2
Bromophos Ethyl	µg/L	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2
Diazinon (Dimpylate)	µg/L	0.5	<0.5
Dichlorvos	µg/L	0.5	<0.5
Dimethoate	µg/L	0.5	<0.5
Ethion	µg/L	0.2	<0.2
Fenitrothion	µg/L	0.2	<0.2
Malathion	µg/L	0.2	<0.2
Methidathion	µg/L	0.5	<0.5
Parathion-ethyl (Parathion)	µg/L	0.2	<0.2

PCBs in Water [AN420] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Arochlor 1016	µg/L	1	<1
Arochlor 1221	µg/L	1	<1
Arochlor 1232	µg/L	1	<1
Arochlor 1242	µg/L	1	<1
Arochlor 1248	µg/L	1	<1
Arochlor 1254	µg/L	1	<1
Arochlor 1260	µg/L	1	<1
Total Arochlors*	µg/L	5	<5

Full 8270 SVOC in Water [AN420] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Acenaphthene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1
Benzo(b&j&k)fluoranthene	µg/L	0.2	<0.2
Benzo(k)fluoranthene	µg/L	0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1
Naphthalene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
2-acetylaminofluorene	µg/L	0.5	<0.5
7,12-dimethyl-benz(a)anthracene	µg/L	0.5	<0.5
3-methylcholanthrene	µg/L	0.5	<0.5
Aldrin	µg/L	0.1	<0.1
Alpha-BHC	µg/L	0.1	<0.1
Beta-BHC	µg/L	0.1	<0.1
Delta-BHC	µg/L	0.1	<0.1
Gamma-BHC (Lindane)	µg/L	0.1	<0.1
p,p-DDD	µg/L	0.1	<0.1
p,p-DDE	µg/L	0.1	<0.1
p,p-DDT	µg/L	0.1	<0.1
Dieldrin	µg/L	0.1	<0.1
Alpha-endosulfan	µg/L	0.1	<0.1
Beta-endosulfan	µg/L	0.1	<0.1
Endosulfan sulphate	µg/L	0.1	<0.1
Endrin	µg/L	0.1	<0.1
Heptachlor	µg/L	0.1	<0.1
Heptachlor epoxide	µg/L	0.1	<0.1
Methoxychlor	µg/L	0.1	<0.1
Mirex	µg/L	0.1	<0.1
Alpha-chlordane	µg/L	0.1	<0.1
Gamma-chlordane	µg/L	0.1	<0.1
Endrin ketone	µg/L	0.1	<0.1
Azinphos-methyl (Guthion)	µg/L	0.2	<0.2
Bromophos ethyl	µg/L	0.2	<0.2
Carbophenothion	µg/L	0.5	<0.5
Chlorfenvinphos-cis	µg/L	5	<5
Chlorfenvinphos-trans	µg/L	0.5	<0.5
Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2
Chlorpyrifos-methyl	µg/L	0.5	<0.5
Co-Ral (Coumaphos)	µg/L	0.5	<0.5
Diazinon (Dimpylate)	µg/L	0.5	<0.5
Dichlorvos	µg/L	0.5	<0.5
Demeton-S-methyl	µg/L	0.5	<0.5
Dimethoate	µg/L	0.5	<0.5
Disulfoton (Di-syston)	µg/L	0.5	<0.5
EPN*	µg/L	0.5	<0.5

Full 8270 SVOC in Water [AN420] Tested: 28/4/2025 (continued)

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Ethion	µg/L	0.2	<0.2
Ethoprophos (ethoprop or prophos)	µg/L	0.5	<0.5
Famphur (Famophos)	µg/L	0.5	<0.5
Fenamiphos (Phenamiphos)	µg/L	0.5	<0.5
Fenchlorophos (Ronnel)	µg/L	0.5	<0.5
Fenitrothion	µg/L	0.2	<0.2
Fenthion	µg/L	0.5	<0.5
Malathion (Maldison)	µg/L	0.2	<0.2
Methidathion	µg/L	0.5	<0.5
Mevinphos-cis/trans	µg/L	1	<1
o,o,o-triethyl phosphorothioate	µg/L	0.5	<0.5
Parathion ethyl (Parathion)	µg/L	0.2	<0.2
Parathion methyl	µg/L	0.5	<0.5
Phorate	µg/L	0.5	<0.5
Pirimiphos-ethyl	µg/L	0.5	<0.5
Pirimiphos-methyl	µg/L	0.5	<0.5
Profenofos	µg/L	0.5	<0.5
Prothiophos (Tokuthion)*	µg/L	0.5	<0.5
Sulfotepp	µg/L	0.5	<0.5
Tetrachlorvinphos (Stirophos)*	µg/L	0.5	<0.5
PCB Congener C28	µg/L	0.1	<0.1
PCB Congener C52	µg/L	0.1	<0.1
PCB Congener C101	µg/L	0.1	<0.1
PCB Congener C118	µg/L	0.1	<0.1
PCB Congener C138	µg/L	0.1	<0.1
PCB Congener C153	µg/L	0.1	<0.1
PCB Congener C180	µg/L	0.1	<0.1
Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
1,2-dichlorobenzene	µg/L	0.5	<0.5
1,3-dichlorobenzene	µg/L	0.5	<0.5
1,4-dichlorobenzene	µg/L	0.5	<0.5
Hexachlorobutadiene	µg/L	0.5	<0.5
Hexachlorocyclopentadiene	µg/L	2	<2
Hexachloroethane	µg/L	0.5	<0.5
Hexachloroproprene	µg/L	0.5	<0.5
Pentachlorobenzene	µg/L	0.5	<0.5
Pentachloroethane	µg/L	0.5	<0.5
1,2,3,5 and 1,2,4,5 -tetrachlorobenzene	µg/L	1	<1
1,2,3,4-tetrachlorobenzene	µg/L	0.5	<0.5
1/2-Chloronaphthalene	µg/L	1	<1
1,2,4-trichlorobenzene	µg/L	0.5	<0.5
Bis(2-ethylhexyl)phthalate	µg/L	10	<10
Bis(2-ethylhexyl)adipate	µg/L	1	<1
Butyl benzyl phthalate	µg/L	1	<1
Di-n-butyl phthalate	µg/L	10	<10
Diethyl phthalate	µg/L	5	<5
Dimethyl phthalate	µg/L	1	<1
Di-n-octyl phthalate	µg/L	1	<1
Carbofuran	µg/L	0.5	<0.5
Carbaryl	µg/L	0.5	<0.5
Trifluralin	µg/L	0.5	<0.5
N-nitroso-di-n-butylamine (NDBA)	µg/L	1	<1
N-nitroso-diethylamine (NDEA)	µg/L	1	<1
N-nitroso-di-n-propylamine (NDPA)	µg/L	1	<1
N-nitroso-morpholine (NMOR)	µg/L	1	<1
N-nitroso-piperidine (NPIP)	µg/L	1	<1

Full 8270 SVOC in Water [AN420] Tested: 28/4/2025 (continued)

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
N-nitroso-pyrrolidine (NPYR)	µg/L	1	<1
4-amino biphenyl	µg/L	1	<1
Acetophenone	µg/L	1	<1
1,3-dinitrobenzene	µg/L	1	<1
2,4-dinitrotoluene	µg/L	1	<1
2,6-dinitrotoluene	µg/L	1	<1
Isophorone	µg/L	1	<1
Nitrobenzene	µg/L	1	<1
p-(dimethylamino) azobenzene	µg/L	1	<1
Phenacetin	µg/L	1	<1
Pentachloronitrobenzene (quintozene)	µg/L	1	<1
Aniline	µg/L	5	<5
4-chloroaniline	µg/L	1	<1
2-nitroaniline	µg/L	1	<1
3-nitroaniline	µg/L	1	<1
4-nitroaniline	µg/L	1	<1
Diphenylamine	µg/L	1	<1
o-toluidine	µg/L	1	<1
5-nitro-o-toluidine	µg/L	1	<1
1-naphthylamine	µg/L	2	<2
2-naphthylamine	µg/L	2	<2
Bis(2-chloroethoxy) methane	µg/L	1	<1
Bis(2-chloroethyl) ether	µg/L	1	<1
Bis(2-chloroisopropyl) ether	µg/L	1	<1
4-chlorophenyl phenyl ether	µg/L	1	<1
4-bromophenyl phenyl ether	µg/L	1	<1
Methyl methanesulfonate	µg/L	1	<1
Ethyl methanesulfonate	µg/L	1	<1
Dibenzofuran	µg/L	1	<1
Benzyl alcohol	µg/L	1	<1
Safrole	µg/L	1	<1
Isosafrole Isomer 1	µg/L	1	<1
Isosafrole Isomer 2	µg/L	1	<1
1,4-naphthoquinone	µg/L	1	<1
Thionazin	µg/L	1	<1
3/4-methyl phenol (m/p-cresol)	µg/L	1	<1
2-methyl phenol (o-cresol)	µg/L	0.5	<0.5
2,6-dichlorophenol	µg/L	0.5	<0.5
2,3,4,6-tetrachlorophenol	µg/L	0.5	<0.5
2,4,5-trichlorophenol	µg/L	0.5	<0.5
4-chloro-3-methylphenol	µg/L	2	<2
2-chlorophenol	µg/L	0.5	<0.5
2,4-dichlorophenol	µg/L	0.5	<0.5
2,4-dimethylphenol	µg/L	0.5	<0.5
2-nitrophenol	µg/L	0.5	<0.5
Phenol	µg/L	0.5	<0.5
2,4,6-trichlorophenol	µg/L	0.5	<0.5
Pentachlorophenol	µg/L	0.5	<0.5
4-nitrophenol	µg/L	1	<1
Total Endosulfan (alpha+beta+sulfate)	µg/L	0.2	<0.2

Total Phenolics in Water [AN295] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Total Phenols	mg/L	0.05	<0.05	<0.05	<0.05

Total Cyanide in water by Discrete Analyser [AN077/AN287] Tested: 1/5/2025

PARAMETER	UOM	LOR	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Total Cyanide	mg/L	0.004	<0.004	<0.004

pH in water [AN101] Tested: 24/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
pH**	pH Units	0.1	**5.0**	**4.0**	**4.9**
Temperature of test*	°C	-	-	-	-

Conductivity and TDS by Calculation - Water [AN106] Tested: 24/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Conductivity @ 25 C	µS/cm	2	**1700**	**1600**	**1400**

Total Dissolved Solids (TDS) in water [AN113] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**2200**	**1800**	**1800**

Turbidity [AN119] Tested: 24/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Turbidity	NTU	0.5	**6700**	**4.5**	**140**

Total and Volatile Suspended Solids (TSS / VSS) [AN114] Tested: 29/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Total Suspended Solids Dried at 103-105°C	mg/L	5	**4300**

Anions by Ion Chromatography in Water [AN245] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Chloride	mg/L	0.05	**1200**
Bromide	mg/L	0.05	**2.8**
Fluoride	mg/L	0.1	<0.10
Sulfate, SO4	mg/L	1	**85**
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005

Nitrite in Water [AN277] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Nitrite Nitrogen, NO2 as N	mg/L	0.005	**0.007**
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**0.007**

Alkalinity [AN135] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Bicarbonate Alkalinity as CaCO3	mg/L	5	**18**
Bicarbonate Alkalinity as HCO3	mg/L	5	**22**
Carbonate Alkalinity as CaCO3	mg/L	5	<5
Carbonate Alkalinity as CO3	mg/L	5	<5
Hydroxide Alkalinity as CaCO3	mg/L	5	<5
Hydroxide Alkalinity as OH	mg/L	5	<5
Total Alkalinity as CaCO3	mg/L	5	**18**
Carbonate Hardness as CaCO3*	mg CaCO3/L	2	**18.394216666666**
Non-Carbonate Hardness as CaCO3*	mg CaCO3/L	2	-
Negative Hardness as CaCO3*	mg CaCO3/L	-100	-

Forms of Carbon [AN190] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Total Organic Carbon as NPOC	mg/L	0.2	**1.8**

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.24**

TKN Kjeldahl Digestion by Discrete Analyser [AN292] Tested: 30/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Total Kjeldahl Nitrogen	mg/L	0.05	**0.72**
Total Nitrogen (calc)	mg/L	0.05	**0.73**

Total Phosphorus by Kjeldahl Digestion DA in Water [AN279/AN293(Sydney only)] Tested: 30/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.56**

Filterable Reactive Phosphorus (FRP) [AN278] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Filterable Reactive Phosphorus as P	mg/L	0.005	<0.005

Calculation of Anion-Cation Balance (SAR Calc) [AN121] Tested: 1/5/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Sum of Ions*	mg/L	10	**2020**
Anion-Cation Balance	%	-100	**-1.13**
TFSS*	mg/L	10	**2020**
Sodium Adsorption Ratio*	No unit	0.1	**13.2**

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples [AN404] Tested: 24/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.05	<0.05	<0.05
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluoropropane sulfonic acid (PFPrS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorononane sulfonic acid (PFNS)	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.01	<0.01	<0.01
1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)	µg/L	0.01	<0.01	<0.01	<0.01
1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)	µg/L	0.01	<0.01	<0.01	<0.01
1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	µg/L	0.01	<0.01	<0.01	<0.01
1H,1H,2H,2H-Perfluorododecane sulfonic acid (10:2	µg/L	0.01	<0.01	<0.01	<0.01
Perfluorooctane sulfonamide (FOSA)	µg/L	0.01	<0.01	<0.01	<0.01
N-Methylperfluoroctane sulfonamide (N-MeFOSA)	µg/L	0.01	<0.01	<0.01	<0.01
N-Ethylperfluoroctane sulfonamide (N-EtFOSA)	µg/L	0.01	<0.01	<0.01	<0.01
N-Methylperfluorooctanesulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	<0.05
N-Ethylperfluorooctanesulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	<0.05
2-(N-Ethylperfluorooctane sulfonamido)-ethanol	µg/L	0.05	<0.05	<0.05	<0.05
2-(N-Methylperfluorooctane sulfonamido)-ethanol	µg/L	0.05	<0.05	<0.05	<0.05
Sum of PFOS and PFHxS	µg/L	0.01	<0.01	<0.01	<0.01
Sum of enHealth PFAS (PFHxS+PFOS+PFOA)	µg/L	0.01	<0.01	<0.01	<0.01
Sum of US EPA PFAS (PFOS+PFOA)	µg/L	0.01	<0.01	<0.01	<0.01
Sum of PFAS A	µg/L	0.01	<0.01	<0.01	<0.01
Sum of PFAS B	µg/L	0.01	<0.01	<0.01	<0.01
Sum of PFAS C	µg/L	0.01	<0.01	<0.01	<0.01
Sum of Positive PFAS	µg/L	0.01	<0.01	<0.01	<0.01

Enterococci in Water [AN705] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Date & Time Processed*	No unit	-	2025-04-23 17:01
Intestinal Enterococci*	CFU/100mL	1	<1
Notes*	No unit	-	-

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 30/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	GW-QR1 WATER - 22/4/2025 SE281816.007
Silver	µg/L	1	<1	-	-	-	-
Aluminium	µg/L	5	**550**	**4000**	**120**	-	-
Arsenic	µg/L	1	**2**	<1	<1	**2**	<1
Cadmium	µg/L	0.1	<0.1	**0.1**	<0.1	<0.1	<0.1
Chromium	µg/L	1	<1	**2**	**1**	<1	<1
Copper	µg/L	1	<1	**1**	**3**	<1	<1
Lead	µg/L	1	<1	<1	<1	<1	<1
Nickel	µg/L	1	**86**	**89**	**40**	**84**	<1
Zinc	µg/L	5	**290**	**340**	**77**	**280**	**6**
Antimony	µg/L	1	<1	-	-	-	-
Barium	µg/L	1	**20**	-	-	-	-
Beryllium	µg/L	1	**2**	-	-	-	-
Boron	µg/L	5	**41**	-	-	-	-
Cobalt	µg/L	1	**85**	-	-	-	-
Iron	µg/L	5	**46000**	-	-	-	-
Manganese	µg/L	1	**2300**	-	-	-	-
Molybdenum	µg/L	1	<1	-	-	-	-
Selenium	µg/L	1	<1	-	-	-	-
Strontium	µg/L	1	**89**	-	-	-	-
Uranium	µg/L	1	<1	-	-	-	-
Vanadium	µg/L	1	<1	-	-	-	-

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 29/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003
Calcium, Ca	mg/L	0.2	**15**	**6.8**	**28**
Magnesium, Mg	mg/L	0.1	**81**	**68**	**46**
Total Hardness by Calculation	mg CaCO3/L	1	**370**	**290**	**260**
Sodium Adsorption Ratio	No unit	0.2	**13**	-	-
Sodium, Na	mg/L	0.5	**580**	-	-
Potassium, K	mg/L	0.1	**7.3**	-	-
Lithium, Li	mg/L	0.005	**0.062**	-	-
Silicon, Si*	mg/L	0.05	**9.9**	-	-
Soluble Silicon as Silica, SiO2*	mg/L	0.1	**21**	-	-

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001	GW-BH2M WATER - 22/4/2025 SE281816.002	GW-BH3M WATER - 22/4/2025 SE281816.003	GW-QD1 WATER - 22/4/2025 SE281816.004	GW-QR1 WATER - 22/4/2025 SE281816.007
Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

E. coli, Total and Faecal (Thermotolerant) coliforms in Water (MPN) [AN735] Tested: 28/4/2025

PARAMETER	UOM	LOR	GW-BH1M WATER - 22/4/2025 SE281816.001
Date & Time Processed*	No unit	-	2025-04-23 16:39
E. coli	MPN/100mL	1	<1
Faecal Coliforms	MPN/100mL	1	<1

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present , measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available . Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN119	Turbidity by Nepholometry: Small particles in a light beam scatter light at a range of angles. A turbidimeter measures this scatter and reports results compared to turbidity standards, in NTU. This procedure is not suitable for very dark coloured liquids or samples with high solids because light absorption causes artificially low light scatter and low turbidity. Reference APHA 2130B.
AN121	This method is used to calculation the balance of major Anions and Cations in water samples and converts major ion concentration to milliequivalents and then summed. Anions sum and Cation sum is calculated as a difference and expressed as a percentage.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO2 is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result . Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O2/C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN278	Filterable Reactive Phosphorus by DA (determined on filtered sample): Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F

AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by DA.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 660 nm by Discrete Analyser.
AN295	The water sample or extract of sample is distilled in a phosphoric acid stream. Phenolic compounds in the distillate react with a reagent stream of potassium hexacyanoferrate(III) and 4-Amino-2,3-dimethyl-3-pryazolin-5-one in an alkaline medium to form a coloured complex which is analysed spectrophotometrically onboard a continuous flow analyser.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken . This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN404	This method covers the analysis of per- and polyfluoroalkyl substances (PFAS) in aqueous, solid and biosolid samples and solvent extracts. After spiking with isotopically labelled quantification surrogates and sample extracts are analysed by liquid chromatography/mass spectrometry (LC-MS/MS). PFAS concentrations are determined by isotope dilution quantification. PFOS and PFHXS are determined as the total of linear and branched isomers.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D). Total PAH calculated from individual analyte detections at or above the limit of reporting .
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
AN703	A known volume of water is passed through a membrane of known pore size. The membrane is placed on a selective agar plate and incubated. The volume of sample filtered depends upon the expected count. Referenced to AS4276.5.
AN705	A known volume of water is passed through a membrane of known pore size. The membrane is placed on a selective agar plate and incubated. The volume of sample filtered depends upon the expected count. Referenced to AS/NZS4276.9 (ISO 7899-2:2000 MOD).
AN735	The Colilert matrix contains two nutrient indicators, ONPG (ortho-nitro-phenyl B-d- galactopyranoside) and MUG (4-methyl-umbelliferyl B-d-glucruonide). As coliforms grow, they use B-galactosidase to metabolise ONPG which causes yellow colouration of the matrix via the nitro-phenyl. E.coli possesses an additional enzyme, B-glucuronidase, which it uses to metabolise MUG and display florescence (caused by the 4 methyl-umbelliferyl). Incubation at 37°C.
AN735	Non target organisms are suppressed by a combination of high salts, detergents etc. present within the matrix . Faecal coliforms are thermotolerant, thus they can be enumerated by testing at 44.5°C.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO2 D.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR			
***	Indicates that both * and ** apply.		Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or

STATEMENT OF QA/QC PERFORMANCE

SE281816 R0

CLIENT DETAILS

Contact	Alejandra Beltran
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	alejandra.beltran@eiaustralia.com.au
Project	**E26577, 37 Archer St. Chatswood NSW**
Order Number	**E26577**
Samples	7

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE281816 R0**
Date Received	23 Apr 2025
Date Reported	02 May 2025

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	E. coli, Total and Faecal (Thermotolerant) coliforms in Water (MPN)	1 item
	Enterococci in Water	1 item
	Nitrite in Water	1 item
	pH in water	3 items
	Turbidity	3 items
Analysis Date	Nitrite in Water	2 items
	pH in water	3 items
	Turbidity	3 items
Duplicate	VOCs in Water	1 item

SAMPLE SUMMARY

Sample counts by matrix	7 Water	Type of documentation received	COC
Date documentation received	23/4/2025	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	8.1°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE281816 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345442	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	29 Apr 2025

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345338	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	28 Apr 2025

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345329	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	29 Apr 2025

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345222	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	20 May 2025	24 Apr 2025
GW-BH2M	SE281816.002	LB345222	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	20 May 2025	24 Apr 2025
GW-BH3M	SE281816.003	LB345222	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	20 May 2025	24 Apr 2025

E. coli, Total and Faecal (Thermotolerant) coliforms in Water (MPN)

Method: ME-(AU)-[ENV]AN735

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345388	22 Apr 2025	23 Apr 2025	23 Apr 2025	28 Apr 2025†	01 May 2025	23 Apr 2025

Enterococci in Water

Method: ME-(AU)-[ENV]AN705

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345388	22 Apr 2025	23 Apr 2025	23 Apr 2025	28 Apr 2025†	01 May 2025	23 Apr 2025

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345338	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	28 Apr 2025

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345149	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	29 Apr 2025	29 Apr 2025

Full 8270 SVOC in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345323	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	01 May 2025
GW-BH2M	SE281816.002	LB345323	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	01 May 2025
GW-BH3M	SE281816.003	LB345323	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	01 May 2025
GW-QD1	SE281816.004	LB345323	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	01 May 2025
GW-QR1	SE281816.007	LB345323	22 Apr 2025	23 Apr 2025	20 May 2025	28 Apr 2025	20 May 2025	01 May 2025

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345593	22 Apr 2025	23 Apr 2025	19 Oct 2025	29 Apr 2025	19 Oct 2025	30 Apr 2025
GW-BH2M	SE281816.002	LB345593	22 Apr 2025	23 Apr 2025	19 Oct 2025	29 Apr 2025	19 Oct 2025	30 Apr 2025
GW-BH3M	SE281816.003	LB345593	22 Apr 2025	23 Apr 2025	19 Oct 2025	29 Apr 2025	19 Oct 2025	30 Apr 2025

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345338	22 Apr 2025	23 Apr 2025	26 Apr 2025	28 Apr 2025†	26 Apr 2025	01 May 2025†

HOLDING TIME SUMMARY

SE281816 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025

OP Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025

PCBs in Water

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	01 May 2025

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples

Method: ME-(AU)-[ENV]AN404

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345173	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	22 May 2025	29 Apr 2025
GW-BH2M	SE281816.002	LB345173	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	22 May 2025	29 Apr 2025
GW-BH3M	SE281816.003	LB345173	22 Apr 2025	23 Apr 2025	20 May 2025	24 Apr 2025	22 May 2025	29 Apr 2025

pH in water

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345222	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	24 Apr 2025†
GW-BH2M	SE281816.002	LB345222	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	24 Apr 2025†
GW-BH3M	SE281816.003	LB345222	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	24 Apr 2025†

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN292

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345640	22 Apr 2025	23 Apr 2025	20 May 2025	30 Apr 2025	20 May 2025	01 May 2025

Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345463	22 Apr 2025	23 Apr 2025	29 Apr 2025	29 Apr 2025	06 May 2025	30 Apr 2025

Total Cyanide in water by Discrete Analyser

Method: ME-(AU)-[ENV]AN077/AN287

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH2M	SE281816.002	LB345756	22 Apr 2025	23 Apr 2025	06 May 2025	01 May 2025	06 May 2025	01 May 2025
GW-BH3M	SE281816.003	LB345756	22 Apr 2025	23 Apr 2025	06 May 2025	01 May 2025	06 May 2025	01 May 2025

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345339	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	29 Apr 2025	29 Apr 2025
GW-BH2M	SE281816.002	LB345339	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	29 Apr 2025	29 Apr 2025
GW-BH3M	SE281816.003	LB345339	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	29 Apr 2025	29 Apr 2025

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN295

Sample Name	Sample No.	QC Ref

HOLDING TIME SUMMARY

SE281816 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Total Phenolics in Water (continued)

Method: ME-(AU)-[ENV]AN295

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345350	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	28 Apr 2025
GW-BH2M	SE281816.002	LB345350	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	28 Apr 2025
GW-BH3M	SE281816.003	LB345350	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	28 Apr 2025

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345640	22 Apr 2025	23 Apr 2025	20 May 2025	30 Apr 2025	20 May 2025	01 May 2025

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345662	22 Apr 2025	23 Apr 2025	19 Oct 2025	30 Apr 2025	19 Oct 2025	30 Apr 2025
GW-BH2M	SE281816.002	LB345662	22 Apr 2025	23 Apr 2025	19 Oct 2025	30 Apr 2025	19 Oct 2025	01 May 2025
GW-BH3M	SE281816.003	LB345662	22 Apr 2025	23 Apr 2025	19 Oct 2025	30 Apr 2025	19 Oct 2025	01 May 2025
GW-QD1	SE281816.004	LB345662	22 Apr 2025	23 Apr 2025	19 Oct 2025	30 Apr 2025	19 Oct 2025	01 May 2025
GW-QR1	SE281816.007	LB345662	22 Apr 2025	23 Apr 2025	19 Oct 2025	30 Apr 2025	19 Oct 2025	01 May 2025

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH2M	SE281816.002	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-BH3M	SE281816.003	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-QD1	SE281816.004	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025
GW-QR1	SE281816.007	LB345318	22 Apr 2025	23 Apr 2025	29 Apr 2025	28 Apr 2025	07 Jun 2025	30 Apr 2025

Turbidity

Method: ME-(AU)-[ENV]AN119

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345226	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	28 Apr 2025†
GW-BH2M	SE281816.002	LB345226	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	28 Apr 2025†
GW-BH3M	SE281816.003	LB345226	22 Apr 2025	23 Apr 2025	23 Apr 2025	24 Apr 2025†	23 Apr 2025	28 Apr 2025†

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-BH2M	SE281816.002	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-BH3M	SE281816.003	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-QD1	SE281816.004	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
TB1	SE281816.005	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
TS1	SE281816.006	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-QR1	SE281816.007	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
GW-BH1M	SE281816.001	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-BH2M	SE281816.002	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-BH3M	SE281816.003	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-QD1	SE281816.004	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
TB1	SE281816.005	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
TS1	SE281816.006	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025
GW-QR1	SE281816.007	LB345332	22 Apr 2025	23 Apr 2025	06 May 2025	28 Apr 2025	06 May 2025	01 May 2025

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Full 8270 SVOC in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2,4,6-Tribromophenol (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	92
2-fluorobiphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	76
d14-p-terphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	54
d5-nitrobenzene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	86
d5-phenol (Surrogate)	GW-BH1M	SE281816.001	%	20 - 130%	70

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	93

OP Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	82
d14-p-terphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	76

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	82
	GW-BH2M	SE281816.002	%	40 - 130%	81
	GW-BH3M	SE281816.003	%	40 - 130%	73
d14-p-terphenyl (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	76
	GW-BH2M	SE281816.002	%	40 - 130%	77
	GW-BH3M	SE281816.003	%	40 - 130%	71
d5-nitrobenzene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	73
	GW-BH2M	SE281816.002	%	40 - 130%	74
	GW-BH3M	SE281816.003	%	40 - 130%	68

PCBs in Water

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
TCMX (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	93

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples

Method: ME-(AU)-[ENV]AN404

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
(13C2_PFTeDA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	86
	GW-BH2M	SE281816.002	%	10 - 150%	115
	GW-BH3M	SE281816.003	%	10 - 150%	78
(13C2-4:2 FTS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 300%	100
	GW-BH2M	SE281816.002	%	40 - 300%	119
	GW-BH3M	SE281816.003	%	40 - 300%	118
(13C2-6:2 FTS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 300%	97
	GW-BH2M	SE281816.002	%	40 - 300%	105
	GW-BH3M	SE281816.003	%	40 - 300%	100
(13C2-8:2 FTS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 300%	51
	GW-BH2M	SE281816.002	%	40 - 300%	92
	GW-BH3M	SE281816.003	%	40 - 300%	86
(13C2-PFDoA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	102
	GW-BH2M	SE281816.002	%	10 - 150%	110
	GW-BH3M	SE281816.003	%	10 - 150%	101
(13C3-PFBS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	103
	GW-BH2M	SE281816.002	%	40 - 150%	107
	GW-BH3M	SE281816.003	%	40 - 150%	104
(13C3-PFHxS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	102
	GW-BH2M	SE281816.002	%	40 - 150%	105
	GW-BH3M	SE281816.003	%	40 - 150%	103
(13C4_PFOA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	97
	GW-BH2M	SE281816.002	%	40 - 150%	101
	GW-BH3M	SE281816.003	%	40 - 150%	98
(13C4-PFBA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	5 - 150%	112
	GW-BH2M	SE281816.002	%	5 - 150%	118
	GW-BH3M	SE281816.003	%	5 - 150%	112

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples (continued) — Method: ME-(AU)-[ENV]AN404

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
(13C4-PFHpA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	110
	GW-BH2M	SE281816.002	%	40 - 150%	110
	GW-BH3M	SE281816.003	%	40 - 150%	107
(13C5-PFHxA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	113
	GW-BH2M	SE281816.002	%	40 - 150%	112
	GW-BH3M	SE281816.003	%	40 - 150%	108
(13C5-PFPeA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	35 - 150%	92
	GW-BH2M	SE281816.002	%	35 - 150%	92
	GW-BH3M	SE281816.003	%	35 - 150%	91
(13C6-PFDA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	82
	GW-BH2M	SE281816.002	%	40 - 150%	80
	GW-BH3M	SE281816.003	%	40 - 150%	83
(13C7-PFUdA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	30 - 150%	69
	GW-BH2M	SE281816.002	%	30 - 150%	84
	GW-BH3M	SE281816.003	%	30 - 150%	70
(13C8-PFOS) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	68
	GW-BH2M	SE281816.002	%	40 - 150%	68
	GW-BH3M	SE281816.003	%	40 - 150%	68
(13C8-PFOSA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	20 - 150%	61
	GW-BH2M	SE281816.002	%	20 - 150%	64
	GW-BH3M	SE281816.003	%	20 - 150%	65
(13C9-PFNA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	40 - 150%	82
	GW-BH2M	SE281816.002	%	40 - 150%	91
	GW-BH3M	SE281816.003	%	40 - 150%	91
(D3-N-MeFOSA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	56
	GW-BH2M	SE281816.002	%	10 - 150%	61
	GW-BH3M	SE281816.003	%	10 - 150%	60
(D3-N-MeFOSAA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	30 - 170%	35
	GW-BH2M	SE281816.002	%	30 - 170%	48
	GW-BH3M	SE281816.003	%	30 - 170%	47
(D5-N-EtFOSA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	67
	GW-BH2M	SE281816.002	%	10 - 150%	62
	GW-BH3M	SE281816.003	%	10 - 150%	67
(D5-N-EtFOSAA) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	20 - 150%	59
	GW-BH2M	SE281816.002	%	20 - 150%	116
	GW-BH3M	SE281816.003	%	20 - 150%	78
(D7-N-MeFOSE) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	80
	GW-BH2M	SE281816.002	%	10 - 150%	86
	GW-BH3M	SE281816.003	%	10 - 150%	79
(D9-N-EtFOSE) Isotopically Labelled Internal Recovery Standard	GW-BH1M	SE281816.001	%	10 - 150%	78
	GW-BH2M	SE281816.002	%	10 - 150%	75
	GW-BH3M	SE281816.003	%	10 - 150%	77

VOCs in Water — Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	102
	GW-BH2M	SE281816.002	%	40 - 130%	103
	GW-BH3M	SE281816.003	%	40 - 130%	102
	GW-QD1	SE281816.004	%	40 - 130%	101
	TB1	SE281816.005	%	40 - 130%	97
	TS1	SE281816.006	%	40 - 130%	94
	GW-QR1	SE281816.007	%	40 - 130%	101
d4-1,2-dichloroethane (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	90
	GW-BH2M	SE281816.002	%	40 - 130%	80
	GW-BH3M	SE281816.003	%	40 - 130%	94
	GW-QD1	SE281816.004	%	40 - 130%	92
	TB1	SE281816.005	%	40 - 130%	91
	TS1	SE281816.006	%	40 - 130%	104
	GW-QR1	SE281816.007	%	40 - 130%	93
d8-toluene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	88
	GW-BH2M	SE281816.002	%	40 - 130%	86

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d8-toluene (Surrogate)	GW-BH3M	SE281816.003	%	40 - 130%	88
	GW-QD1	SE281816.004	%	40 - 130%	87
	TB1	SE281816.005	%	40 - 130%	86
	TS1	SE281816.006	%	40 - 130%	99
	GW-QR1	SE281816.007	%	40 - 130%	88

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	102
	GW-BH2M	SE281816.002	%	40 - 130%	103
	GW-BH3M	SE281816.003	%	40 - 130%	102
	GW-QD1	SE281816.004	%	40 - 130%	101
	GW-QR1	SE281816.007	%	40 - 130%	101
d4-1,2-dichloroethane (Surrogate)	GW-BH1M	SE281816.001	%	60 - 130%	90
	GW-BH2M	SE281816.002	%	60 - 130%	80
	GW-BH3M	SE281816.003	%	60 - 130%	94
	GW-QD1	SE281816.004	%	60 - 130%	92
	GW-QR1	SE281816.007	%	60 - 130%	93
d8-toluene (Surrogate)	GW-BH1M	SE281816.001	%	40 - 130%	88
	GW-BH2M	SE281816.002	%	40 - 130%	86
	GW-BH3M	SE281816.003	%	40 - 130%	88
	GW-QD1	SE281816.004	%	40 - 130%	87
	GW-QR1	SE281816.007	%	40 - 130%	88

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result
LB345442.001	Bicarbonate Alkalinity as CaCO3	mg/L	5	<5
	Carbonate Alkalinity as CaCO3	mg/L	5	<5
	Total Alkalinity as CaCO3	mg/L	5	<5

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result
LB345338.001	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result
LB345329.001	Fluoride	mg/L	0.1	<0.10
	Chloride	mg/L	0.05	<0.05
	Bromide	mg/L	0.05	<0.05
	Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005
	Sulfate, SO4	mg/L	1	<1.0

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result
LB345222.001	Conductivity @ 25 C	µS/cm	2	<2

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Number	Parameter	Units	LOR	Result
LB345338.001	Filterable Reactive Phosphorus as P	mg/L	0.005	<0.005

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Number	Parameter	Units	LOR	Result
LB345149.001	Total Organic Carbon as NPOC	mg/L	0.2	<0.2

Full 8270 SVOC in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB345318.001	01-PAHs	Acenaphthene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Benzo(a)anthracene	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
		Chrysene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		1-methylnaphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		Naphthalene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
		2-acetylaminofluorene	µg/L	0.5	<0.5
		7,12-dimethyl-benz(a)anthracene	µg/L	0.5	<0.5
		3-methylcholanthrene	µg/L	0.5	<0.5
	02-OCs	Aldrin	µg/L	0.1	<0.1
		Alpha-BHC	µg/L	0.1	<0.1
		Beta-BHC	µg/L	0.1	<0.1
		Delta-BHC	µg/L	0.1	<0.1
		Gamma-BHC (Lindane)	µg/L	0.1	<0.1
		p,p-DDD	µg/L	0.1	<0.1
		p,p-DDE	µg/L	0.1	<0.1
		p,p-DDT	µg/L	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Full 8270 SVOC in Water (continued) — **Method: ME-(AU)-[ENV]AN420**

Sample Number		Parameter	Units	LOR	Result
LB345318.001	02-OCs	Dieldrin	µg/L	0.1	<0.1
		Alpha-endosulfan	µg/L	0.1	<0.1
		Beta-endosulfan	µg/L	0.1	<0.1
		Endosulfan sulphate	µg/L	0.1	<0.1
		Endrin	µg/L	0.1	<0.1
		Heptachlor	µg/L	0.1	<0.1
		Heptachlor epoxide	µg/L	0.1	<0.1
		Methoxychlor	µg/L	0.1	<0.1
		Mirex	µg/L	0.1	<0.1
		Alpha-chlordane	µg/L	0.1	<0.1
		Gamma-chlordane	µg/L	0.1	<0.1
		Endrin ketone	µg/L	0.1	<0.1
	03-OPs	Azinphos-methyl (Guthion)	µg/L	0.2	<0.2
		Bromophos ethyl	µg/L	0.2	<0.2
		Carbophenothion	µg/L	0.5	<0.5
		Chlorfenvinphos-cis	µg/L	5	<5
		Chlorfenvinphos-trans	µg/L	0.5	<0.5
		Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2
		Chlorpyrifos-methyl	µg/L	0.5	<0.5
		Co-Ral (Coumaphos)	µg/L	0.5	<0.5
		Diazinon (Dimpylate)	µg/L	0.5	<0.5
		Dichlorvos	µg/L	0.5	<0.5
		Demeton-S-methyl	µg/L	0.5	<0.5
		Dimethoate	µg/L	0.5	<0.5
		Disulfoton (Di-syston)	µg/L	0.5	<0.5
		EPN*	µg/L	0.5	<0.5
		Ethion	µg/L	0.2	<0.2
		Ethoprophos (ethoprop or prophos)	µg/L	0.5	<0.5
		Famphur (Famophos)	µg/L	0.5	<0.5
		Fenamiphos (Phenamiphos)	µg/L	0.5	<0.5
		Fenchlorophos (Ronnel)	µg/L	0.5	<0.5
		Fenitrothion	µg/L	0.2	<0.2
		Fenthion	µg/L	0.5	<0.5
		Malathion (Maldison)	µg/L	0.2	<0.2
		Methidathion	µg/L	0.5	<0.5
		Mevinphos-cis/trans	µg/L	1	<1
		o,o,o-triethyl phosphorothioate	µg/L	0.5	<0.5
		Parathion ethyl (Parathion)	µg/L	0.2	<0.2
		Parathion methyl	µg/L	0.5	<0.5
		Phorate	µg/L	0.5	<0.5
		Pirimiphos-ethyl	µg/L	0.5	<0.5
		Pirimiphos-methyl	µg/L	0.5	<0.5
		Profenofos	µg/L	0.5	<0.5
		Prothiophos (Tokuthion)*	µg/L	0.5	<0.5
		Sulfotepp	µg/L	0.5	<0.5
	04-PCB UPAC(7) Congeners	PCB Congener C28	µg/L	0.1	<0.1
		PCB Congener C52	µg/L	0.1	<0.1
		PCB Congener C101	µg/L	0.1	<0.1
		PCB Congener C118	µg/L	0.1	<0.1
		PCB Congener C138	µg/L	0.1	<0.1
		PCB Congener C153	µg/L	0.1	<0.1
		PCB Congener C180	µg/L	0.1	<0.1
	05-SVCH (Cl Benzenes, Hydrocarbons & VOCs)	Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
		1,2-dichlorobenzene	µg/L	0.5	<0.5
		1,3-dichlorobenzene	µg/L	0.5	<0.5
		1,4-dichlorobenzene	µg/L	0.5	<0.5
		Hexachlorobutadiene	µg/L	0.5	<0.5
		Hexachlorocyclopentadiene	µg/L	2	<2
		Hexachloroethane	µg/L	0.5	<0.5
		Hexachloroproprene	µg/L	0.5	<0.5
		Pentachlorobenzene	µg/L	0.5	<0.5

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Full 8270 SVOC in Water (continued) — **Method: ME-(AU)-[ENV]AN420**

Sample Number		Parameter	Units	LOR	Result
LB345318.001	05-SVCH (Cl Benzenes, Hydrocarbons & VOCs)	Pentachloroethane	µg/L	0.5	<0.5
		1,2,3,5 and 1,2,4,5 -tetrachlorobenzene	µg/L	1	<1
		1,2,3,4-tetrachlorobenzene	µg/L	0.5	<0.5
		1/2-Chloronaphthalene	µg/L	1	<1
		1,2,4-trichlorobenzene	µg/L	0.5	<0.5
	06-Phthalates	Bis(2-ethylhexyl)phthalate	µg/L	10	<10
		Bis(2-ethylhexyl)adipate	µg/L	1	1
		Butyl benzyl phthalate	µg/L	1	<1
		Di-n-butyl phthalate	µg/L	10	<10
		Diethyl phthalate	µg/L	5	<5
		Dimethyl phthalate	µg/L	1	<1
		Di-n-octyl phthalate	µg/L	1	<1
	07-Carbamates	Carbofuran	µg/L	0.5	<0.5
		Carbaryl	µg/L	0.5	<0.5
	08-Herbicides (normal)	Trifluralin	µg/L	0.5	<0.5
	09-Nitrosamines	N-nitroso-di-n-butylamine (NDBA)	µg/L	1	<1
		N-nitroso-diethylamine (NDEA)	µg/L	1	<1
		N-nitroso-di-n-propylamine (NDPA)	µg/L	1	<1
		N-nitroso-morpholine (NMOR)	µg/L	1	<1
		N-nitroso-piperidine (NPIP)	µg/L	1	<1
		N-nitroso-pyrrolidine (NPYR)	µg/L	1	<1
		4-amino biphenyl	µg/L	1	<1
	10-Nitroaromatics and Ketones	Acetophenone	µg/L	1	<1
		1,3-dinitrobenzene	µg/L	1	<1
		2,4-dinitrotoluene	µg/L	1	<1
		2,6-dinitrotoluene	µg/L	1	<1
		Isophorone	µg/L	1	<1
		Nitrobenzene	µg/L	1	<1
		p-(dimethylamino) azobenzene	µg/L	1	<1
		Phenacetin	µg/L	1	<1
		Pentachloronitrobenzene (quintozene)	µg/L	1	<1
	11-Anilines and Amines	Aniline	µg/L	5	<5
		4-chloroaniline	µg/L	1	<1
		2-nitroaniline	µg/L	1	<1
		3-nitroaniline	µg/L	1	<1
		4-nitroaniline	µg/L	1	<1
		Diphenylamine	µg/L	1	<1
		o-toluidine	µg/L	1	<1
		5-nitro-o-toluidine	µg/L	1	<1
		1-naphthylamine	µg/L	2	<2
		2-naphthylamine	µg/L	2	<2
	12-Haloethers	Bis(2-chloroethoxy) methane	µg/L	1	<1
		Bis(2-chloroethyl) ether	µg/L	1	<1
		Bis(2-chloroisopropyl) ether	µg/L	1	<1
		4-chlorophenyl phenyl ether	µg/L	1	<1
		4-bromophenyl phenyl ether	µg/L	1	<1
	13-Other SVOCs	Methyl methanesulfonate	µg/L	1	<1
		Ethyl methanesulfonate	µg/L	1	<1
		Dibenzofuran	µg/L	1	<1
		Benzyl alcohol	µg/L	1	<1
		Safrole	µg/L	1	<1
		Isosafrole Isomer 1	µg/L	1	<1
		Isosafrole Isomer 2	µg/L	1	<1
		1,4-naphthoquinone	µg/L	1	<1
		Thionazin	µg/L	1	<1
	14-Speciated Routine Phenols	3/4-methyl phenol (m/p-cresol)	µg/L	1	<1
		2-methyl phenol (o-cresol)	µg/L	0.5	<0.5
		2,6-dichlorophenol	µg/L	0.5	<0.5
		2,4,5-trichlorophenol	µg/L	0.5	<0.5
		4-chloro-3-methylphenol	µg/L	2	<2
		2-chlorophenol	µg/L	0.5	<0.5

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Full 8270 SVOC in Water (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB345318.001	14-Speciated Routine Phenols	2,4-dichlorophenol	µg/L	0.5	<0.5
		2,4-dimethylphenol	µg/L	0.5	<0.5
		2-nitrophenol	µg/L	0.5	<0.5
		Phenol	µg/L	0.5	<0.5
		2,4,6-trichlorophenol	µg/L	0.5	<0.5
		Pentachlorophenol	µg/L	0.5	<0.5
		4-nitrophenol	µg/L	1	<1
	Surrogates	d5-phenol (Surrogate)	%	-	105
		d5-nitrobenzene (Surrogate)	%	-	128
		2-fluorobiphenyl (Surrogate)	%	-	70
		2,4,6-Tribromophenol (Surrogate)	%	-	113
		d14-p-terphenyl (Surrogate)	%	-	94

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Number	Parameter	Units	LOR	Result
LB345323.001	Mercury	mg/L	0.00005	<0.00005

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result
LB345593.001	Calcium, Ca	mg/L	0.2	<0.2
	Magnesium, Mg	mg/L	0.1	<0.1
	Potassium, K	mg/L	0.1	<0.1
	Silicon, Si*	mg/L	0.05	<0.05
	Sodium, Na	mg/L	0.5	<0.5

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Number	Parameter	Units	LOR	Result
LB345338.001	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB345318.001	Alpha BHC	µg/L	0.1	<0.1
	Hexachlorobenzene (HCB)	µg/L	0.1	<0.1
	Beta BHC	µg/L	0.1	<0.1
	Lindane (gamma BHC)	µg/L	0.1	<0.1
	Delta BHC	µg/L	0.1	<0.1
	Heptachlor	µg/L	0.1	<0.1
	Aldrin	µg/L	0.1	<0.1
	Heptachlor epoxide	µg/L	0.1	<0.1
	Gamma Chlordane	µg/L	0.1	<0.1
	Alpha Chlordane	µg/L	0.1	<0.1
	Alpha Endosulfan	µg/L	0.1	<0.1
	p,p'-DDE	µg/L	0.1	<0.1
	Dieldrin	µg/L	0.1	<0.1
	Endrin	µg/L	0.1	<0.1
	Beta Endosulfan	µg/L	0.1	<0.1
	p,p'-DDD	µg/L	0.1	<0.1
	Endrin aldehyde	µg/L	0.1	<0.1
	Endosulfan sulphate	µg/L	0.1	<0.1
	p,p'-DDT	µg/L	0.1	<0.1
	Endrin ketone	µg/L	0.1	<0.1
	Methoxychlor	µg/L	0.1	<0.1
	Mirex	µg/L	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	75

OP Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

OP Pesticides in Water (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB345318.001		Azinphos-methyl	µg/L	0.2	<0.2
		Bromophos Ethyl	µg/L	0.2	<0.2
		Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	<0.2
		Diazinon (Dimpylate)	µg/L	0.5	<0.5
		Dichlorvos	µg/L	0.5	<0.5
		Dimethoate	µg/L	0.5	<0.5
		Ethion	µg/L	0.2	<0.2
		Fenitrothion	µg/L	0.2	<0.2
		Malathion	µg/L	0.2	<0.2
		Methidathion	µg/L	0.5	<0.5
		Parathion-ethyl (Parathion)	µg/L	0.2	<0.2
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	78
		d14-p-terphenyl (Surrogate)	%	-	84

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB345318.001		Naphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		1-methylnaphthalene	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-cd)pyrene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	74
		2-fluorobiphenyl (Surrogate)	%	-	78
		d14-p-terphenyl (Surrogate)	%	-	84

PCBs in Water

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB345318.001	Arochlor 1016	µg/L	1	<1
	Arochlor 1221	µg/L	1	<1
	Arochlor 1232	µg/L	1	<1
	Arochlor 1242	µg/L	1	<1
	Arochlor 1248	µg/L	1	<1
	Arochlor 1254	µg/L	1	<1
	Arochlor 1260	µg/L	1	<1

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples

Method: ME-(AU)-[ENV]AN404

Sample Number	Parameter	Units	LOR	Result
LB345173.001	Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.05
	Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.01
	Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01
	Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01
	Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01
	Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01
	Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.01
	Perfluoropropane sulfonic acid (PFPrS)	µg/L	0.01	<0.01
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.01

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples (continued)

Method: ME-(AU)-[ENV]AN404

Sample Number	Parameter	Units	LOR	Result
LB345173.001	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01
	Perfluorononane sulfonic acid (PFNS)	µg/L	0.01	<0.01
	Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.01
	1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)	µg/L	0.01	<0.01
	1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)	µg/L	0.01	<0.01
	1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	µg/L	0.01	<0.01
	1H,1H,2H,2H-Perfluorododecane sulfonic acid (10:2 FTS)	µg/L	0.01	<0.01
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.01	<0.01
	N-Methylperfluorooctane sulfonamide (N-MeFOSA)	µg/L	0.01	<0.01
	N-Ethylperfluorooctane sulfonamide (N-EtFOSA)	µg/L	0.01	<0.01
	N-Methylperfluorooctanesulfonamidoacetic acid (N_MeFOSAA)	µg/L	0.05	<0.05
	N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	µg/L	0.05	<0.05
	2-(N-Methylperfluorooctane sulfonamido)-ethanol (N-MeFOSE)	µg/L	0.05	<0.05
	2-(N-Ethylperfluorooctane sulfonamido)-ethanol (N-EtFOSE)	µg/L	0.05	<0.05

Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result
LB345463.001	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5

Total Cyanide in water by Discrete Analyser

Method: ME-(AU)-[ENV]AN077/AN287

Sample Number	Parameter	Units	LOR	Result
LB345756.001	Total Cyanide	mg/L	0.004	<0.004

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result
LB345339.001	Total Dissolved Solids Dried at 175-185°C	mg/L	10	<10

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN295

Sample Number	Parameter	Units	LOR	Result
LB345350.001	Total Phenols	mg/L	0.05	<0.05

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Sample Number	Parameter	Units	LOR	Result
LB345640.001	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	<0.02

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB345662.001	Aluminium	µg/L	5	<5
	Antimony	µg/L	1	<1
	Arsenic	µg/L	1	<1
	Barium	µg/L	1	<1
	Beryllium	µg/L	1	<1
	Boron	µg/L	5	<5
	Cadmium	µg/L	0.1	<0.1
	Chromium	µg/L	1	<1
	Cobalt	µg/L	1	<1
	Copper	µg/L	1	<1
	Iron	µg/L	5	<5
	Lead	µg/L	1	<1
	Manganese	µg/L	1	<1
	Molybdenum	µg/L	1	<1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Trace Metals (Dissolved) in Water by ICPMS (continued)

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB345662.001	Nickel	µg/L	1	<1
	Selenium	µg/L	1	<1
	Silver	µg/L	1	<1
	Strontium	µg/L	1	<1
	Uranium	µg/L	1	<1
	Vanadium	µg/L	1	<1
	Zinc	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB345318.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

Turbidity

Method: ME-(AU)-[ENV]AN119

Sample Number	Parameter	Units	LOR	Result
LB345226.001	Turbidity	NTU	0.5	0.5

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB345332.001	Fumigants	2,2-dichloropropane	µg/L	0.5	<0.5
		1,2-dichloropropane	µg/L	0.5	<0.5
		cis-1,3-dichloropropene	µg/L	0.5	<0.5
		trans-1,3-dichloropropene	µg/L	0.5	<0.5
		1,2-dibromoethane (EDB)	µg/L	0.5	<0.5
	Halogenated Aliphatics	Dichlorodifluoromethane (CFC-12)	µg/L	5	<5
		Chloromethane	µg/L	5	<5
		Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3
		Bromomethane	µg/L	10	<10
		Chloroethane	µg/L	5	<5
		Trichlorofluoromethane	µg/L	1	<1
		1,1-dichloroethene	µg/L	0.5	<0.5
		Iodomethane	µg/L	5	<5
		Dichloromethane (Methylene chloride)	µg/L	5	<5
		Allyl chloride	µg/L	2	<2
		trans-1,2-dichloroethene	µg/L	0.5	<0.5
		1,1-dichloroethane	µg/L	0.5	<0.5
		cis-1,2-dichloroethene	µg/L	0.5	<0.5
		Bromochloromethane	µg/L	0.5	<0.5
		1,2-dichloroethane	µg/L	0.5	<0.5
		1,1,1-trichloroethane	µg/L	0.5	<0.5
		1,1-dichloropropene	µg/L	0.5	<0.5
		Carbon tetrachloride	µg/L	0.5	<0.5
		Dibromomethane	µg/L	0.5	<0.5
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5
		1,1,2-trichloroethane	µg/L	0.5	<0.5
		1,3-dichloropropane	µg/L	0.5	<0.5
		Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5
		1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5
		cis-1,4-dichloro-2-butene	µg/L	1	<1
		1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5
		1,2,3-trichloropropane	µg/L	0.5	<0.5
		trans-1,4-dichloro-2-butene	µg/L	1	<1
		1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5
		Hexachlorobutadiene	µg/L	0.5	<0.5
	Halogenated Aromatics	Chlorobenzene	µg/L	0.5	<0.5
		Bromobenzene	µg/L	0.5	<0.5
		2-chlorotoluene	µg/L	0.5	<0.5
		4-chlorotoluene	µg/L	0.5	<0.5

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB345332.001	Halogenated Aromatics	1,3-dichlorobenzene	µg/L	0.5	<0.5
		1,4-dichlorobenzene	µg/L	0.3	<0.3
		1,2-dichlorobenzene	µg/L	0.5	<0.5
		1,2,4-trichlorobenzene	µg/L	0.5	<0.5
		1,2,3-trichlorobenzene	µg/L	0.5	<0.5
	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5
		Toluene	µg/L	0.5	<0.5
		Ethylbenzene	µg/L	0.5	<0.5
		m/p-xylene	µg/L	1	<1
		Styrene (Vinyl benzene)	µg/L	0.5	<0.5
		o-xylene	µg/L	0.5	<0.5
		Isopropylbenzene (Cumene)	µg/L	0.5	<0.5
		n-propylbenzene	µg/L	0.5	<0.5
		1,3,5-trimethylbenzene	µg/L	0.5	<0.5
		tert-butylbenzene	µg/L	0.5	<0.5
		1,2,4-trimethylbenzene	µg/L	0.5	<0.5
		sec-butylbenzene	µg/L	0.5	<0.5
		p-isopropyltoluene	µg/L	0.5	<0.5
		n-butylbenzene	µg/L	0.5	<0.5
	Nitrogenous Compounds	Acrylonitrile	µg/L	0.5	<0.5
	Oxygenated Compounds	Acetone (2-propanone)	µg/L	10	<10
		MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5
		Vinyl acetate*	µg/L	10	<10
		MEK (2-butanone)	µg/L	10	<10
		MIBK (4-methyl-2-pentanone)	µg/L	5	<5
		2-hexanone (MBK)	µg/L	5	<5
	Polycyclic VOCs	Naphthalene (VOC)*	µg/L	0.5	<0.5
	Sulphonated	Carbon disulfide	µg/L	2	<2
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	104
		d8-toluene (Surrogate)	%	-	87
		Bromofluorobenzene (Surrogate)	%	-	97
	Trihalomethanes	Chloroform (THM)	µg/L	0.5	<0.5
		Bromodichloromethane (THM)	µg/L	0.5	<0.5
		Dibromochloromethane (THM)	µg/L	0.5	<0.5
		Bromoform (THM)	µg/L	0.5	<0.5

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB345332.001		TRH C6-C9	µg/L	40	<40
	Surrogates	d4-1,2-dichloroethane (Surrogate)	%	-	104
		d8-toluene (Surrogate)	%	-	87
		Bromofluorobenzene (Surrogate)	%	-	97

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Alkalinity

Method: ME-(AU)-[ENV]AN135

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281805.002	LB345442.013	Bicarbonate Alkalinity as CaCO3	mg/L	5	6	6	102	2
		Carbonate Alkalinity as CaCO3	mg/L	5	<1	<1	200	0
		Total Alkalinity as CaCO3	mg/L	5	6	6	102	2
SE281905.001	LB345442.023	Bicarbonate Alkalinity as CaCO3	mg/L	5	88	85	21	4
		Carbonate Alkalinity as CaCO3	mg/L	5	<1	<1	200	0
		Total Alkalinity as CaCO3	mg/L	5	88	85	21	4

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281883.002	LB345338.026	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	5.1	5.1	15	1
SE281905.001	LB345338.037	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	0.52	0.51	17	3

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281650.002	LB345329.025	Nitrate Nitrogen, NO3-N	mg/L	0.005	0.025	0.030	33	18
SE281756.006	LB345329.014	Chloride	mg/L	0.05	5400	5400	15	1
		Sulfate, SO4	mg/L	1	320	320	15	1

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281827.001	LB345222.014	Conductivity @ 25 C	µS/cm	2	340	340	16	1

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281805.004	LB345149.013	Total Organic Carbon as NPOC	mg/L	0.2	4.0	4.0	20	0
SE281839.001	LB345149.019	Total Organic Carbon as NPOC	mg/L	0.2	1.0	0.9	36	6

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.004	LB345323.014	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
SE281882.004	LB345323.024	Mercury	µg/L	0.00005	<0.0001	<0.0001	182	0

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281827.001	LB345593.014	Calcium, Ca	mg/L	0.2	38	38	16	1
		Magnesium, Mg	mg/L	0.1	3.4	3.5	18	1

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281842.001	LB345338.014	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	122	0
SE281905.001	LB345338.037	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples

Method: ME-(AU)-[ENV]AN404

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.001	LB345173.004	Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.05	<0.05	200	0
		Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.01	<0.01	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples (continued)

Method: ME-(AU)-[ENV]AN404

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.001	LB345173.004	Perfluoropropane sulfonic acid (PFPrS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorononane sulfonic acid (PFNS)	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.01	<0.01	200	0
		1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)	µg/L	0.01	<0.01	<0.01	200	0
		1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)	µg/L	0.01	<0.01	<0.01	200	0
		1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	µg/L	0.01	<0.01	<0.01	200	0
		1H,1H,2H,2H-Perfluorododecane sulfonic acid (10:2	µg/L	0.01	<0.01	<0.01	200	0
		Perfluorooctane sulfonamide (FOSA)	µg/L	0.01	<0.01	<0.01	200	0
		N-Methylperfluorooctane sulfonamide (N-MeFOSA)	µg/L	0.01	<0.01	<0.01	200	0
		N-Ethylperfluorooctane sulfonamide (N-EtFOSA)	µg/L	0.01	<0.01	<0.01	200	0
		N-Methylperfluorooctanesulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	200	0
		N-Ethylperfluorooctanesulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	200	0
		2-(N-Methylperfluorooctane sulfonamido)-ethanol	µg/L	0.05	<0.05	<0.05	200	0
		2-(N-Ethylperfluorooctane sulfonamido)-ethanol	µg/L	0.05	<0.05	<0.05	200	0
		Sum of PFOS and PFHxS	µg/L	0.01	<0.01	<0.01	200	0
		Sum of enHealth PFAS (PFHxS+PFOS+PFOA)	µg/L	0.01	<0.01	<0.01	200	0
		Sum of US EPA PFAS (PFOS+PFOA)	µg/L	0.01	<0.01	<0.01	200	0
		Sum of PFAS A	µg/L	0.01	<0.01	<0.01	200	0
		Sum of PFAS B	µg/L	0.01	<0.01	<0.01	200	0
		Sum of PFAS C	µg/L	0.01	<0.01	<0.01	200	0
		Sum of Positive PFAS	µg/L	0.01	<0.01	<0.01	200	0
		(13C4-PFBA) Isotopically Labelled Internal Recovery	%	-	112	107	200	4
		(13C5-PFPeA) Isotopically Labelled Internal Recovery	%	-	92	88	200	4
		(13C5-PFHxA) Isotopically Labelled Internal Recovery	%	-	113	108	200	4
		(13C4-PFHpA) Isotopically Labelled Internal Recovery	%	-	110	106	200	4
		(13C4_PFOA) Isotopically Labelled Internal Recovery	%	-	97	100	200	3
		(13C9-PFNA) Isotopically Labelled Internal Recovery	%	-	82	82	200	0
		(13C6-PFDA) Isotopically Labelled Internal Recovery	%	-	82	81	200	1
		(13C7-PFUdA) Isotopically Labelled Internal Recovery	%	-	69	69	200	0
		(13C2-PFDoA) Isotopically Labelled Internal Recovery	%	-	102	96	200	7
		(13C2_PFTeDA) Isotopically Labelled Internal Recovery	%	-	86	88	200	3
		(13C3-PFBS) Isotopically Labelled Internal Recovery	%	-	103	101	200	2
		(13C3-PFHxS) Isotopically Labelled Internal Recovery	%	-	102	103	200	1
		(13C8-PFOS) Isotopically Labelled Internal Recovery	%	-	68	71	200	4
		(13C8-PFOSA) Isotopically Labelled Internal Recovery	%	-	61	57	200	6
		(D3-N-MeFOSAA) Isotopically Labelled Internal	%	-	35	34	200	2
		(D5-N-EtFOSAA) Isotopically Labelled Internal Recovery	%	-	59	53	200	10
		(13C2-4:2 FTS) Isotopically Labelled Internal Recovery	%	-	100	94	200	6
		(13C2-6:2 FTS) Isotopically Labelled Internal Recovery	%	-	97	104	200	7
		(13C2-8:2 FTS) Isotopically Labelled Internal Recovery	%	-	51	66	200	25
		(D7-N-MeFOSE) Isotopically Labelled Internal Recovery	%	-	80	78	200	3
		(D9-N-EtFOSE) Isotopically Labelled Internal Recovery	%	-	78	76	200	3
		(D3-N-MeFOSA) Isotopically Labelled Internal Recovery	%	-	56	58	200	2
		(D5-N-EtFOSA) Isotopically Labelled Internal Recovery	%	-	67	65	200	4

pH in water

Method: ME-(AU)-[ENV]AN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281827.001	LB345222.014	pH**	pH Units	0.1	6.8	6.6	16	3

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN292

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.001	LB345640.014	Total Kjeldahl Nitrogen	mg/L	0.05	0.72	0.72	22	1

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281813.001	LB345463.013	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5	<5	200	0
SE281897.001	LB345463.024	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5	<5	200	0

Total Cyanide in water by Discrete Analyser

Method: ME-(AU)-[ENV]AN077/AN287

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.002	LB345756.004	Total Cyanide	mg/L	0.004	<0.004	<0.004	200	0

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281805.003	LB345339.013	Total Dissolved Solids Dried at 175-185°C	mg/L	10	94	79	27	17
SE281882.003	LB345339.023	Total Dissolved Solids Dried at 175-185°C	mg/L	10	1700	1800	16	2

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN295

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281908.001	LB345350.014	Total Phenols	mg/L	0.05	<0.05	<0.05	200	0
SE281913.001	LB345350.018	Total Phenols	mg/L	0.05	<0.05	<0.05	200	0

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281773.002	LB345640.018	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	<0.02	<0.02	200	0
SE281816.001	LB345640.014	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	0.56	0.57	19	1

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281818.001	LB345662.014	Lead	µg/L	1	<1	<1	200	0
SE281879.027	LB345662.024	Arsenic	µg/L	1	<1	<1	200	0
		Cadmium	µg/L	0.1	<0.1	<0.1	200	0
		Chromium	µg/L	1	<1	<1	200	0
		Copper	µg/L	1	<1	<1	200	0
		Lead	µg/L	1	<1	<1	200	0
		Nickel	µg/L	1	<1	<1	200	0
		Zinc	µg/L	5	6	6	97	7

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.007	LB345318.028		TRH C10-C14	µg/L	50	<50	<50	200	0
			TRH C15-C28	µg/L	200	<200	<200	200	0
			TRH C29-C36	µg/L	200	<200	<200	200	0
			TRH C37-C40	µg/L	200	<200	<200	200	0
			TRH C10-C40	µg/L	320	<320	<320	200	0
		TRH F Bands	TRH >C10-C16	µg/L	60	<60	<60	200	0
			TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	200	0
			TRH >C16-C34 (F3)	µg/L	500	<500	<500	200	0
			TRH >C34-C40 (F4)	µg/L	500	<500	<500	200	0
SE281884.023	LB345318.029		TRH C10-C14	µg/L	50	0	0	200	0
			TRH C15-C28	µg/L	200	0	0	200	0
			TRH C29-C36	µg/L	200	0	0	200	0
			TRH C37-C40	µg/L	200	0	0	200	0
			TRH C10-C40	µg/L	320	0	0	200	0
		TRH F Bands	TRH >C10-C16	µg/L	60	0	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	µg/L	60	-0.0421806092	0	200	0
			TRH >C16-C34 (F3)	µg/L	500	0	0	200	0
			TRH >C34-C40 (F4)	µg/L	500	0	0	200	0

Turbidity

Method: ME-(AU)-[ENV]AN119

Original	Duplicate	Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Turbidity (continued)

Method: ME-(AU)-[ENV]AN119

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281882.001	LB345226.015	Turbidity	NTU	0.5	460	450	15	2
SE281909.001	LB345226.019	Turbidity	NTU	0.5	7.7	7.0	22	9

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281805.001	LB345332.028	Monocyclic	Benzene	µg/L	0.5	0.022151999	0.0236261243	200	0
		Aromatic	Toluene	µg/L	0.5	0.048452439	0.0707234834	200	0
			Ethylbenzene	µg/L	0.5	0.016738334	0.0419982390	200	0
			m/p-xylene	µg/L	1	0.047265318	0.1082000823	200	0
			o-xylene	µg/L	0.5	0.014699140	0.0468097768	200	0
		Polycyclic	Naphthalene (VOC)*	µg/L	0.5	0.195043419	0.2067412110	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.2	8.2	30	11
			d8-toluene (Surrogate)	µg/L	-	8.7	8.5	30	3
			Bromofluorobenzene (Surrogate)	µg/L	-	10.2	9.1	30	11
		Totals	Total BTEX	µg/L	3	0	0	200	0
SE281816.002	LB345332.024	Fumigants	2,2-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			trans-1,3-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dibromoethane (EDB)	µg/L	0.5	<0.5	<0.5	200	0
		Halogenated	Dichlorodifluoromethane (CFC-12)	µg/L	5	<5	<5	200	0
		Aliphatics	Chloromethane	µg/L	5	<5	<5	200	0
			Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3	<0.3	200	0
			Bromomethane	µg/L	10	<10	<10	200	0
			Chloroethane	µg/L	5	<5	<5	200	0
			Trichlorofluoromethane	µg/L	1	<1	<1	200	0
			1,1-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			Iodomethane	µg/L	5	<5	<5	200	0
			Dichloromethane (Methylene chloride)	µg/L	5	<5	<5	200	0
			Allyl chloride	µg/L	2	<2	<2	200	0
			trans-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			1,1-dichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,2-dichloroethene	µg/L	0.5	<0.5	<0.5	200	0
			Bromochloromethane	µg/L	0.5	<0.5	<0.5	200	0
			1,2-dichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,1,1-trichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,1-dichloropropene	µg/L	0.5	<0.5	<0.5	200	0
			Carbon tetrachloride	µg/L	0.5	<0.5	<0.5	200	0
			Dibromomethane	µg/L	0.5	<0.5	<0.5	200	0
			Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5	<0.5	200	0
			1,1,2-trichloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,3-dichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5	<0.5	200	0
			1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	200	0
			cis-1,4-dichloro-2-butene	µg/L	1	<1	0.0385095187	200	0
			1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5	<0.5	200	0
			1,2,3-trichloropropane	µg/L	0.5	<0.5	<0.5	200	0
			trans-1,4-dichloro-2-butene	µg/L	1	<1	<1	200	0
			1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5	<0.5	200	0
			Hexachlorobutadiene	µg/L	0.5	<0.5	<0.5	200	0
		Halogenated	Chlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
		Aromatics	Bromobenzene	µg/L	0.5	<0.5	<0.5	200	0
			2-chlorotoluene	µg/L	0.5	<0.5	<0.5	200	0
			4-chlorotoluene	µg/L	0.5	<0.5	<0.5	200	0
			1,3-dichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,4-dichlorobenzene	µg/L	0.3	<0.3	<0.3	200	0
			1,2-dichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,2,4-trichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
			1,2,3-trichlorobenzene	µg/L	0.5	<0.5	<0.5	200	0
		Monocyclic	Benzene	µg/L	0.5	<0.5	0.0386824185	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

VOCs in Water (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281816.002	LB345332.024	Monocyclic	Toluene	µg/L	0.5	1.4	3.3364656128	51	85 ②
		Aromatic	Ethylbenzene	µg/L	0.5	<0.5	0.0374571984	200	0
			m/p-xylene	µg/L	1	<1	0.0995738171	200	0
			Styrene (Vinyl benzene)	µg/L	0.5	<0.5	0.0071138909	200	0
			o-xylene	µg/L	0.5	<0.5	0.0479459254	200	0
			Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	0.0150705660	200	0
			n-propylbenzene	µg/L	0.5	<0.5	0.0046425560	200	0
			1,3,5-trimethylbenzene	µg/L	0.5	<0.5	0.0126609773	200	0
			tert-butylbenzene	µg/L	0.5	<0.5	0.0008605836	200	0
			1,2,4-trimethylbenzene	µg/L	0.5	<0.5	0.0306986862	200	0
			sec-butylbenzene	µg/L	0.5	<0.5	0.0031588709	200	0
			p-isopropyltoluene	µg/L	0.5	<0.5	0.0044762701	200	0
			n-butylbenzene	µg/L	0.5	<0.5	0.0036082553	200	0
		Nitrogenous	Acrylonitrile	µg/L	0.5	<0.5	0.0264247570	200	0
		Compounds	2-nitropropane	µg/L	100	<100	0.6817131717	200	0
		Oxygenated	Acetone (2-propanone)	µg/L	10	<10	0	200	0
		Compounds	MtBE (Methyl-tert-butyl ether)	µg/L	0.5	<0.5	0.0011017719	200	0
			Vinyl acetate*	µg/L	10	<10	0.0222517687	200	0
			MEK (2-butanone)	µg/L	10	<10	0	200	0
			MIBK (4-methyl-2-pentanone)	µg/L	5	<5	0	200	0
			2-hexanone (MBK)	µg/L	5	<5	0.0090881563	200	0
		Polycyclic	Naphthalene (VOC)*	µg/L	0.5	<0.5	0.0562781303	200	0
		Sulphonated	Carbon disulfide	µg/L	2	<2	0.3476513734	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	8.0	9.1	30	13
			d8-toluene (Surrogate)	µg/L	-	8.6	8.5	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	10.3	9.5	30	8
		Totals	Total BTEX	µg/L	3	<3	3.3364656128	158	11
			Total VOC	µg/L	10	<10	3.3960584569	200	0
		Trihalomethan	Chloroform (THM)	µg/L	0.5	<0.5	<0.5	200	0
		es	Bromodichloromethane (THM)	µg/L	0.5	<0.5	<0.5	200	0
			Dibromochloromethane (THM)	µg/L	0.5	<0.5	<0.5	200	0
			Bromoform (THM)	µg/L	0.5	<0.5	<0.5	200	0

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281805.001	LB345332.028		TRH C6-C10	µg/L	50	0	3.5743644563	200	0
			TRH C6-C9	µg/L	40	0	0	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.1539496362	8.2218246431	30	11
			d8-toluene (Surrogate)	µg/L	-	8.7415924147	8.5221666634	30	3
			Bromofluorobenzene (Surrogate)	µg/L	-	10.1644138083	9.1441686139	30	11
		VPH F Bands	Benzene (F0)	µg/L	0.5	0.0221519991	0.0236261243	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	0	3.5743644563	200	0
SE281816.002	LB345332.023		TRH C6-C10	µg/L	50	<50	0	200	0
			TRH C6-C9	µg/L	40	<40	0	200	0
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	8.0	9.1400112184	30	13
			d8-toluene (Surrogate)	µg/L	-	8.6	8.4983694873	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	10	9.5329601181	30	8
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	0.0386824185	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	-3.3364656128	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345338.002	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	2.6	2.5	80 - 120	105

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345329.002	Fluoride	mg/L	0.1	2.1	2	80 - 120	106
	Chloride	mg/L	0.05	18	20	80 - 120	91
	Bromide	mg/L	0.05	1.9	2	80 - 120	96
	Nitrate Nitrogen, NO3-N	mg/L	0.005	2.0	2	80 - 120	101
	Sulfate, SO4	mg/L	1	21	20	80 - 120	103

Conductivity and TDS by Calculation - Water

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345222.002	Conductivity @ 25 C	µS/cm	2	1000	1015	85 - 115	102

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345338.002	Filterable Reactive Phosphorus as P	mg/L	0.005	0.11	0.1	80 - 120	110

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345149.002	Total Organic Carbon as NPOC	mg/L	0.2	19	20	80 - 120	93

Full 8270 SVOC in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002	01-PAHs	Acenaphthene	µg/L	0.1	37	40	60 - 140	92
		Acenaphthylene	µg/L	0.1	37	40	60 - 140	92
		Anthracene	µg/L	0.1	34	40	60 - 140	85
		Benzo(a)pyrene	µg/L	0.1	45	40	60 - 140	111
		Fluoranthene	µg/L	0.1	32	40	60 - 140	80
		Naphthalene	µg/L	0.1	27	40	60 - 140	68
		Phenanthrene	µg/L	0.1	35	40	60 - 140	87
		Pyrene	µg/L	0.1	33	40	60 - 140	83
	02-OCs	Aldrin	µg/L	0.1	3.4	4	60 - 140	84
		Delta-BHC	µg/L	0.1	4.3	4	60 - 140	108
		p,p-DDT	µg/L	0.1	3.0	4	60 - 140	76
		Dieldrin	µg/L	0.1	4.1	4	60 - 140	103
		Endrin	µg/L	0.1	3.7	4	60 - 140	92
		Heptachlor	µg/L	0.1	4.7	4	60 - 140	119
	03-OPs	Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	7.7	8	60 - 140	97
		Diazinon (Dimpylate)	µg/L	0.5	10	8	60 - 140	130
		Dichlorvos	µg/L	0.5	11	8	60 - 140	139
		Ethion	µg/L	0.2	8.1	8	60 - 140	101
	05-SVCH (Cl	Hexachlorobenzene (HCB)	µg/L	0.1	3.9	4	60 - 140	97
	Benzenes,	Hexachlorobutadiene	µg/L	0.5	4.1	4	60 - 140	103
		Hexachloroethane	µg/L	0.5	4.1	4	60 - 140	102
		Pentachlorobenzene	µg/L	0.5	3.8	4	60 - 140	96
		1,2,3,4-tetrachlorobenzene	µg/L	0.5	3.9	4	60 - 140	96
	06-Phthalates	Bis(2-ethylhexyl)phthalate	µg/L	10	<10	8	60 - 140	118
		Butyl benzyl phthalate	µg/L	1	7	8	60 - 140	92
		Di-n-butyl phthalate	µg/L	10	<10	8	60 - 140	94
		Diethyl phthalate	µg/L	5	9	8	60 - 140	107
		Dimethyl phthalate	µg/L	1	7	8	60 - 140	92
		Di-n-octyl phthalate	µg/L	1	9	8	60 - 140	116
	09-Nitrosamine	N-nitroso-di-n-propylamine (NDPA)	µg/L	1	31	32	60 - 140	98
	10-Nitroaromat	Pentachloronitrobenzene (quintozene)	µg/L	1	5	4	60 - 140	134

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Full 8270 SVOC in Water (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002	14-Speciated	2,4-dichlorophenol	µg/L	0.5	55	40	60 - 140	137
	Routine	Phenol	µg/L	0.5	48	40	60 - 140	121
		2,4,6-trichlorophenol	µg/L	0.5	54	40	60 - 140	135
		Pentachlorophenol	µg/L	0.5	55	40	60 - 140	138
	Surrogates	d5-phenol (Surrogate)	µg/L	-	2.2	2	40 - 130	110
		d5-nitrobenzene (Surrogate)	µg/L	-	0.61	0.5	40 - 130	122
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.36	0.5	40 - 130	72
		2,4,6-Tribromophenol (Surrogate)	µg/L	-	5.8	5	40 - 130	116
		d14-p-terphenyl (Surrogate)	µg/L	-	0.42	0.5	40 - 130	84

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345593.002	Calcium, Ca	mg/L	0.2	46	50.5	80 - 120	92
	Lithium, Li	mg/L	0.005	0.10	0.1	80 - 120	103
	Magnesium, Mg	mg/L	0.1	46	50.5	80 - 120	92
	Potassium, K	mg/L	0.1	50	55	80 - 120	92
	Silicon, Si*	mg/L	0.05	0.26	0.25	80 - 120	104
	Sodium, Na	mg/L	0.5	47	50.5	80 - 120	93

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345338.002	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.092	0.1	80 - 120	92

OC Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002		Delta BHC	µg/L	0.1	0.2	0.2	60 - 140	87
		Heptachlor	µg/L	0.1	0.2	0.2	60 - 140	82
		Aldrin	µg/L	0.1	0.2	0.2	60 - 140	79
		Dieldrin	µg/L	0.1	0.2	0.2	60 - 140	84
		Endrin	µg/L	0.1	0.2	0.2	60 - 140	85
		p,p'-DDT	µg/L	0.1	0.1	0.2	60 - 140	70
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	µg/L	-	0.12	0.15	40 - 130	79

OP Pesticides in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002		Chlorpyrifos (Chlorpyrifos Ethyl)	µg/L	0.2	8.0	8	60 - 140	100
		Diazinon (Dimpylate)	µg/L	0.5	8.2	8	60 - 140	103
		Dichlorvos	µg/L	0.5	5.8	8	60 - 140	73
		Ethion	µg/L	0.2	9.0	8	60 - 140	113
	Surrogates	2-fluorobiphenyl (Surrogate)	µg/L	-	0.40	0.5	40 - 130	80
		d14-p-terphenyl (Surrogate)	µg/L	-	0.39	0.5	40 - 130	78

PAH (Polynuclear Aromatic Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002		Naphthalene	µg/L	0.1	38	40	60 - 140	95
		Acenaphthylene	µg/L	0.1	43	40	60 - 140	107
		Acenaphthene	µg/L	0.1	42	40	60 - 140	106
		Phenanthrene	µg/L	0.1	43	40	60 - 140	108
		Anthracene	µg/L	0.1	42	40	60 - 140	104
		Fluoranthene	µg/L	0.1	42	40	60 - 140	106
		Pyrene	µg/L	0.1	49	40	60 - 140	121
		Benzo(a)pyrene	µg/L	0.1	55	40	60 - 140	139
	Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.35	0.5	40 - 130	70
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.40	0.5	40 - 130	80
		d14-p-terphenyl (Surrogate)	µg/L	-	0.39	0.5	40 - 130	78

PCBs in Water

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002	Arochlor 1260	µg/L	1	<1	0.4	60 - 140	116

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous Samples

Method: ME-(AU)-[ENV]AN404

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345173.002	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.15	0.2	40 - 160	76
	Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.20	0.2	40 - 160	98
	Perfluorononanoic acid (PFNA)	µg/L	0.01	0.17	0.2	40 - 160	87
	Perfluorodecanoic acid (PFDA)	µg/L	0.01	0.15	0.2	40 - 160	76
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	0.16	0.2	40 - 160	78
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	0.18	0.2	40 - 160	90
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.16	0.2	40 - 160	78
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.01	0.14	0.2	40 - 160	72

pH in water

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345222.003	pH**	pH Units	0.1	7.4	7.415	98 - 102	100

Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345463.002	Total Suspended Solids Dried at 103-105°C	mg/L	5	97	100	80 - 120	97

Total Cyanide in water by Discrete Analyser

Method: ME-(AU)-[ENV]AN077/AN287

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345756.002	Total Cyanide	mg/L	0.004	0.028	0.025	80 - 120	113

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN295

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345350.002	Total Phenols	mg/L	0.05	0.20	0.2	80 - 120	101

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345640.002	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	1.1	1	80 - 120	111

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345662.002	Aluminium	µg/L	5	19	20	80 - 120	94
	Antimony	µg/L	1	17	20	80 - 120	85
	Arsenic	µg/L	1	17	20	80 - 120	87
	Barium	µg/L	1	19	20	80 - 120	97
	Beryllium	µg/L	1	19	20	80 - 120	93
	Boron	µg/L	5	20	20	80 - 120	101
	Cadmium	µg/L	0.1	19	20	80 - 120	95
	Chromium	µg/L	1	19	20	80 - 120	95
	Cobalt	µg/L	1	20	20	80 - 120	99
	Copper	µg/L	1	20	20	80 - 120	100
	Iron	µg/L	5	19	20	80 - 120	95
	Lead	µg/L	1	20	20	80 - 120	98
	Manganese	µg/L	1	20	20	80 - 120	102
	Molybdenum	µg/L	1	17	20	80 - 120	83
	Nickel	µg/L	1	19	20	80 - 120	96
	Selenium	µg/L	1	18	20	80 - 120	90
	Silver	µg/L	1	17	20	80 - 120	86
	Strontium	µg/L	1	18	20	80 - 120	91
	Uranium	µg/L	1	20	20	80 - 120	100
	Vanadium	µg/L	1	19	20	80 - 120	93
	Zinc	µg/L	5	21	20	80 - 120	107

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Water

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345318.002		TRH C10-C14	µg/L	50	1100	1200	60 - 140	88
		TRH C15-C28	µg/L	200	1300	1200	60 - 140	111
		TRH C29-C36	µg/L	200	1300	1200	60 - 140	110
	TRH F Bands	TRH >C10-C16	µg/L	60	1200	1200	60 - 140	101
		TRH >C16-C34 (F3)	µg/L	500	1300	1200	60 - 140	112
		TRH >C34-C40 (F4)	µg/L	500	670	600	60 - 140	111

VOCs in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345332.002	Halogenated	1,1-dichloroethene	µg/L	0.5	60	45.45	60 - 140	133
	Aliphatics	1,2-dichloroethane	µg/L	0.5	54	45.45	60 - 140	118
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	50	45.45	60 - 140	109
	Halogenated	Chlorobenzene	µg/L	0.5	42	45.45	60 - 140	93
	Monocyclic	Benzene	µg/L	0.5	51	45.45	60 - 140	112
	Aromatic	Toluene	µg/L	0.5	52	45.45	60 - 140	114
		Ethylbenzene	µg/L	0.5	51	45.45	60 - 140	112
		m/p-xylene	µg/L	1	100	90.9	60 - 140	112
		o-xylene	µg/L	0.5	52	45.45	60 - 140	115
	Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.8	10	60 - 140	98
		d8-toluene (Surrogate)	µg/L	-	10.0	10	70 - 130	100
		Bromofluorobenzene (Surrogate)	µg/L	-	9.9	10	70 - 130	99
	Trihalomethan	Chloroform (THM)	µg/L	0.5	49	45.45	60 - 140	108

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345332.002		TRH C6-C10	µg/L	50	790	946.63	60 - 140	83
		TRH C6-C9	µg/L	40	690	818.71	60 - 140	84
	Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.8	10	60 - 140	98
		d8-toluene (Surrogate)	µg/L	-	10	10	70 - 130	100
		Bromofluorobenzene (Surrogate)	µg/L	-	9.9	10	70 - 130	99
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	480	639.67	60 - 140	75

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281593A.001	LB345338.004	Ammonia Nitrogen, NH_3 as N	mg/L	0.01	2.6	0.08	2.5	102

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281805.001	LB345329.026	Chloride	mg/L	0.05	52	29.91	20	111
		Nitrate Nitrogen, NO3-N	mg/L	0.005	2.2	0.0408	2	107
		Sulfate, SO4	mg/L	1	29	7.58	20	107

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281593A.001	LB345338.004	Filterable Reactive Phosphorus as P	mg/L	0.005	0.12	<0.005	0.1	114

Forms of Carbon

Method: ME-(AU)-[ENV]AN190

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281744.001	LB345149.020	Total Organic Carbon as NPOC	mg/L	0.2	54	6.7	50	95

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281805.001	LB345323.004	Mercury	mg/L	0.00005	0.0018	-0.024	0.008	93

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281658A.001	LB345593.004	Calcium, Ca	mg/L	0.2	130	71.33	50.5	123
		Magnesium, Mg	mg/L	0.1	68	3.9717	50.5	126

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281593A.001	LB345338.004	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.088	<0.005	0.1	86

Total Phenolics in Water

Method: ME-(AU)-[ENV]AN295

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281658A.001	LB345350.004	Total Phenols	mg/L	0.05	0.20	<0.05	0.2	99

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281773.001	LB345640.019	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	1.3	0.29	1	101

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281805.001	LB345662.004	Arsenic	µg/L	1	18	0.152	20	89
		Boron	µg/L	5	36	17.731	20	93
		Cadmium	µg/L	0.1	19	0.017	20	93
		Chromium	µg/L	1	19	0.742	20	93
		Cobalt	µg/L	1	19	0.042	20	96
		Copper	µg/L	1	22	2.39	20	97
		Iron	µg/L	5	230	209.706	20	110
		Lead	µg/L	1	20	0.96	20	96

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Trace Metals (Dissolved) in Water by ICPMS (continued)

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE281805.001	LB345662.004	Manganese	µg/L	1	23	2.885	20	99
		Molybdenum	µg/L	1	18	1.159	20	86
		Nickel	µg/L	1	20	1.743	20	89
		Selenium	µg/L	1	18	0.103	20	91
		Zinc	µg/L	5	45	24.809	20	103

VOCs in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE281816.007	LB345332.027	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5	45.45	106
			Toluene	µg/L	0.5	<0.5	45.45	107
			Ethylbenzene	µg/L	0.5	<0.5	45.45	101
			m/p-xylene	µg/L	1	<1	90.9	101
			o-xylene	µg/L	0.5	<0.5	45.45	101
		Polycyclic	Naphthalene (VOC)*	µg/L	0.5	<0.5	-	-
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.3	-	90
			d8-toluene (Surrogate)	µg/L	-	8.8	-	95
			Bromofluorobenzene (Surrogate)	µg/L	-	10.1	-	92
		Totals	Total BTEX	µg/L	3	<3	-	-

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE281816.007	LB345332.027		TRH C6-C10	µg/L	50	<50	946.63	101
			TRH C6-C9	µg/L	40	<40	818.71	101
		Surrogates	d4-1,2-dichloroethane (Surrogate)	µg/L	-	9.3	-	90
			d8-toluene (Surrogate)	µg/L	-	8.8	-	95
			Bromofluorobenzene (Surrogate)	µg/L	-	10	-	92
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	-	-
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	639.67	105

MATRIX SPIKE DUPLICATES

SE281816 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

Sheet _1 of 1_

Site: 37 Archer Street, Chatswood NSW

Project No: E26577

Laboratory: SGS Australia
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: SOIL	WATER	0.45 µm field filtered	OTHER	Analysis: Alkalinity (bicarbonate, carbonate, hydroxide and total), total dissolved solids (TDS), total hardness	Turbidity* (NTU), total suspended solids* (TSS), total organic carbon* (TOC), sodium absorption ratio* (SAR).	Major anions: Sulfate (SO4), chloride (Cl), carbonates (CO3), bromide (Br), fluoride (F).	Major cations: Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K).	Cation/anion balance (as a percentage).	Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO2), silver (Ag), strontium (Sr), uranium (U), vanadium (V), zinc (Zn).	Nutrients. Ammonia (NH3), nitrate (NO3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P), reactive phosphorus (P).	Faecal coliforms, faecal streptococci, Escherichia coli.	Organics: Benzene toluene ethylbenzene xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total recoverable hydrocarbons (TRHs).	volatile chlorinated hydrocarbons (VOCs), phenols , pesticides (OCPS, OPPs), polychlorinated biphenyls (PCBs)	semivolatile chlorinated hydrocarbons (SVOCs)	chlorinated aliphatics, Total Phenol	perfluoroalkyl and polyfluoroalkyl substances (PFAS)	HM A, TRH, BTEX	BTEX	Volatile Organic Compounds (VOCs)	Dewatering Suite	PFAS	Turbidity
GW-BH1M	1	S,P,VC	22/04/2025	PM		X	X		X	X	X	X	X	X	X	X	X	X	X	X								
GW-BH2M	2	S,P,VC	22/04/2025	PM		X	X																	X	X	X	X	
GW-BH3M	3	S,P,VC	22/04/2025	PM		X	X																	X	X	X	X	
GW-QD1	4	S,P,VC	22/04/2025	PM		X	X																X					
GW-QT1		S,P,VC	22/04/2025	PM		X	X																					
TB1	5	lab provided	22/04/2025	PM		X																	X					
TS1	6	lab provided	22/04/2025	PM		X																	X					
GW-QR1	7	S,P,VC	22/04/2025	PM		X																X						

SGS EHS Sydney COC
SE281816

Comments

HM A
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM B
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH
Total Phenol

LABORATORY TURNAROUND
- [X] Standard
- [ ] 24 Hours
- [ ] 48 Hours
- [ ] 72 Hours
- [ ] Other____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag BB = Bulk Bag

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

COC June 2021 FORM v.5 - SGS

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI):		Received by (SGS):
Print	Charlie Tek	Print
Signature		Signature
Date	23/04/2024	Date 23/04/25 @ 2:10

Sampler's Comments:
CC Alejandra Beltran & Mariana Barbosa

Please forward "GW-QT1" to Envirolab

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

SAMPLE RECEIPT ADVICE

SE281816

CLIENT DETAILS

Contact	Alejandra Beltran
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 95160722
Facsimile	(Not specified)
Email	alejandra.beltran@eiaustralia.com.au
Project	**E26577, 37 Archer St. Chatswood NSW**
Order Number	**E26577**
Samples	7

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 23/4/2025
Report Due	Thu 1/5/2025
SGS Reference	**SE281816**

SUBMISSION DETAILS

This is to confirm that 7 samples were received on Wednesday 23/4/2025. Results are expected to be ready by COB Thursday 1/5/2025.
Please quote SGS reference SE281816 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	7 Water	Type of documentation received	COC
Date documentation received	23/4/2025	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	8.1°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

Extra TB3, TSC sample received.
GW-QT1 Forwarded to Envirolab.

SAMPLE RECEIPT ADVICE

SE281816

CLIENT DETAILS

Client EI AUSTRALIA

Project E26577, 37 Archer St. Chatswood NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Full 8270 SVOC in Water	OC Pesticides in Water	OP Pesticides in Water	PAH (Polynuclear Aromatic Hydrocarbons) in Water	PCBs in Water	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	GW-BH1M	167	26	13	22	9	9	78	6
002	GW-BH2M	-	-	-	23	-	9	78	7
003	GW-BH3M	-	-	-	23	-	9	78	7
004	GW-QD1	-	-	-	-	-	9	11	7
005	TB1	-	-	-	-	-	-	11	-
006	TS1	-	-	-	-	-	-	11	-
007	GW-QR1	-	-	-	-	-	9	11	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE281816

CLIENT DETAILS

Client EI AUSTRALIA

Project E26577, 37 Archer St. Chatswood NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Alkalinity	Anions by Ion Chromatography in Water	Conductivity and TDS by Calculation - Water	Nitrite in Water	pH in water	Total and Volatile Suspended Solids (TSS /	Total Cyanide in water by Discrete Analyser	Total Dissolved Solids (TDS) in water	Total Phenolics in Water	Turbidity
001	GW-BH1M	10	5	1	2	2	1	-	1	1	1
002	GW-BH2M	-	-	1	-	2	-	1	1	1	1
003	GW-BH3M	-	-	1	-	2	-	1	1	1	1

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE281816

CLIENT DETAILS

Client EI AUSTRALIA

Project E26577, 37 Archer St. Chatswood NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Ammonia Nitrogen by Discrete Analyser	Calculation of Anion-Cation Balance	E. coli and Thermotolerant coliforms in Water (CFU)	Enterococci in Water	Filterable Reactive Phosphorus (FRP)	Forms of Carbon	Per- and Polyfluoroalkyl Substances (PFAS) in	TKN Kjeldahl Digestion by Discrete Analyser	Total Phosphorus by Kjeldahl Digestion DA in	Trace Metals (Dissolved) in Water by ICPMS
001	GW-BH1M	1	4	3	3	1	1	60	2	1	21
002	GW-BH2M	-	-	-	-	-	-	60	-	-	8
003	GW-BH3M	-	-	-	-	-	-	60	-	-	8
004	GW-QD1	-	-	-	-	-	-	-	-	-	7
007	GW-QR1	-	-	-	-	-	-	-	-	-	7

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE281816

CLIENT DETAILS

Client EI AUSTRALIA

Project E26577, 37 Archer St. Chatswood NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES
001	GW-BH1M	1	9
002	GW-BH2M	1	3
003	GW-BH3M	1	3
004	GW-QD1	1	-
007	GW-QR1	1	-

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

Updated CoC: 24/4/25 1509

Sheet 1 of 1

Site:	Project No:
37 Archer Street, Chatswood NSW	E26577

Laboratory: **Envirolab Services**
12 Ashley Street,
CHATSWOOD NSW 2067
P: 02 9910 6200

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: SOIL	WATER	0.45 µm field filtered	OTHER	Analysis: HM [A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM [A] /TRH/BTEX/PAHs	HM [A] /TRH (including, F1, F2, F3, F4)/BTEX	BTEX	PAHs, TRH (including F1, F2, F3, F4)	Asbestos	Asbestos Quantification	Excavated Natural Material (ENM) Suite	Dewatering Suite	pH / pH peroxide	sPOCAS	Chromium Reducible Sulfur (CrS)	PFAS	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	Sulphate / Chloride	HOLD	Lead	TCLP HM [B] / PAH	Comments
GW-QT1	1	S, P, 2xVC	22/04/2025	AM		X					X																	

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

Job No: 379104

Date Received: 28/4/25
Time Received: 1520
Received By: KW
Temp: Cool/Ambient 12°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Comments

HM [A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM [B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH

LABORATORY TURNAROUND

- [X] Standard
- [ ] 24 Hours
- [ ] 48 Hours
- [ ] 72 Hours
- [ ] Other____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI):	Received by (Envirolab):
Print: Charlie Tek	Print: Katy Wayne
Signature:	Signature:
Date: 24/04/2025	Date: 28/4/25 1520

Sampler's Comments:

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

#379104
28/4 KW

Sheet _1 of 1_

Site: 37 Archer Street, Chatswood NSW

Project No: E26577

Laboratory: SGS Australia
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: SOIL	WATER	0.45 µm field filtered	OTHER	Alkalinity (bicarbonate, carbonate, hydroxide and total), total dissolved solids (TDS), total hardness	Turbidity* (NTU), total suspended solids* (TSS), total organiccarbon* (TOC), sodium absorption ratio* (SAR).	Major anions: Sulfate (SO_4), chloride (Cl), carbonates (CO_3), bromide (Br), fluoride (F).	Major cations: Calcium (Ca), magnesium (Mg), sodium (Na), potassium (K).	Cation/anion balance (as a percentage).	Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO_2), silver (Ag), strontium (Sr), uranium (U), vanadium (V), zinc (Zn).	Nutrients, Ammonia (NH_3), nitrate (NO_3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P), reactive phosphorus (P).	Faecal coliforms, faecal streptococci, Escherichia coli.	Organics: Benzene toluene ethylbenzene xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total recoverable hydrocarbons (TRHs).	volatile chlorinated hydrocarbons (VOCs), phenols , pesticides (OCPS, OPPs), polychlorinated biphenyls (PCBs)	semivolatile chlorinated hydrocarbons (SVOCs)	chlorinated aliphatics, Total Phenol	perfluoroalkyl and polyfluoroalkyl substances (PFAS)	HM A, TRH, BTEX	BTEX	Volatile Organic Compounds (VOCs)	Dewatering Suite	PFAS	Turbidity
GW-BH1M		S,P,VC	22/04/2025	PM		X	X		X	X	X	X	X	X	X	X	X	X	X	X								
GW-BH2M		S,P,VC	22/04/2025	PM		X	X																X	X	X	X		
GW-BH3M		S,P,VC	22/04/2025	PM		X	X																X	X	X	X		
GW-QD1		S,P,VC	22/04/2025	PM		X	X															X						
GW-QT1		S,P,VC	22/04/2025	PM		X	X																					
TB1		lab provided	22/04/2025	PM		X																	X					
TS1		lab provided	22/04/2025	PM		X																	X					
GW-QR1		S,P,VC	22/04/2025	PM		X																X						
														CLP - 8 wk														

Comments

HM A: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc

HM B: Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel

Dewatering Suite: pH & EC, TDS / TDU, Hardness, Total Cyanide, Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH (F1, F2, F3, F4), BTEX, PAH, Total Phenol

LABORATORY TURNAROUND
- [X] Standard
- [ ] 24 Hours
- [ ] 48 Hours
- [ ] 72 Hours
- [ ] Other____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag BB = Bulk Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table [ ]

Sampler's Name (EI):	Received by (SGS):
Print: Charlie Tek	Print:
Signature:	Signature:
Date: 23/04/2024	Date: 23/04/25 @ 2:10

Sampler's Comments:
CC Alejandra Beltran & Mariana Barbosa

Please forward "GW-QT1" to Envirolab

1

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

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 379104

Client Details

Client	EI Australia
Attention	Charlie Tek
Address	Suite 6.01, 55 Miller Street, Pyrmont, NSW, 2009

Sample Details

Your Reference	**E26577 - 37 Archer Street, Chatswood NSW**
Number of Samples	1 Water
Date samples received	28/04/2025
Date completed instructions received	28/04/2025

Analysis Details

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

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

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

Report Details

Date results requested by	05/05/2025
Date of Issue	05/05/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Timothy Toll, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water		
Our Reference		379104-1
Your Reference	UNITS	GW-QT1
Date Sampled		22/04/2025
Type of sample		Water
Date extracted	-	29/04/2025
Date analysed	-	30/04/2025
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	101
Surrogate Toluene-d8	%	96
Surrogate 4-Bromofluorobenzene	%	104

svTRH (C10-C40) in Water		
Our Reference	UNITS	379104-1
Your Reference		GW-QT1
Date Sampled		22/04/2025
Type of sample		Water
Date extracted	-	29/04/2025
Date analysed	-	30/04/2025
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
Total +ve TRH (C10-C36)	µg/L	<50
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Total +ve TRH (>C10-C40)	µg/L	<50
Surrogate o-Terphenyl	%	103

HM in water - dissolved		
Our Reference		379104-1
Your Reference	UNITS	GW-QT1
Date Sampled		22/04/2025
Type of sample		Water
Date prepared	-	01/05/2025
Date analysed	-	01/05/2025
Arsenic-Dissolved	µg/L	1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	89
Zinc-Dissolved	µg/L	270

Method ID	Methodology Summary
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-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-W4	[NT]
Date extracted	-			29/04/2025	1	29/04/2025	30/04/2025		29/04/2025	[NT]
Date analysed	-			30/04/2025	1	30/04/2025	01/05/2025		30/04/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	113	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	113	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	111	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	112	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	117	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	114	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	99	1	101	101	0	98	[NT]
Surrogate Toluene-d8	%		Org-023	96	1	96	100	4	100	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	100	1	104	99	5	95	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/04/2025	[NT]	[NT]	[NT]	[NT]	29/04/2025	[NT]
Date analysed	-			30/04/2025	[NT]	[NT]	[NT]	[NT]	30/04/2025	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	103	[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]	101	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	103	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate o-Terphenyl	%		Org-020	87	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W6	[NT]
Date prepared	-			02/05/2025	[NT]	[NT]	[NT]	[NT]	02/05/2025	[NT]
Date analysed	-			02/05/2025	[NT]	[NT]	[NT]	[NT]	02/05/2025	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	87	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

Appendix H – QA/QC Assessment

H1.1 Quality Assurance / Quality Control Program

Quality assurance comprises an assessment of the reliability of the field procedures and laboratory results against standard industry practices and the SAQP. A summary of the project QA/QC measures incorporated into this investigation is presented in **Table H-1**.

Table H-1 Project QC Measures

Task	Description	Project
Field QA/QC		
General	Work was to be undertaken following standard field procedures which are based on industry accepted standard practice.	Groundwater samples were obtained using sample bottles/vials provided by the laboratory.
	All fieldwork was supervised by a suitably qualified and experienced scientist or engineer.	Yes
Soil Screening with PID	The PID was serviced and calibrated as per manufacturer requirements. PID calibrated at the beginning of each day of fieldwork.	Yes
Equipment Decontamination	Sampling equipment to be decontaminated after the collection of each soil sample by washing with phosphate-free detergent and potable water, followed by a final distilled water rinse. One rinsate blank would be collected and analysed for the primary contaminants. All results should be non-detect.	One rinsate sample was collected during the groundwater investigation on 22 April 2025. All concentrations were reported as below the detection limits.
Transport	Samples stored in a chilled cooler box and transported to the laboratories. To ensure the integrity of the samples from collection to receipt by the analytical laboratory, samples were sent by courier to the laboratories under 'chain of custody' describing sample preservation and transport duration.	Yes
Trip Blanks	Trip blank samples were to be prepared and analysed by the primary laboratory for BTEX. Analytical results to be below the laboratory LOR, indicating satisfactory sample transport and handling conditions were achieved.	One trip blank samples were collected during the investigation. All concentrations were reported as below the detection limits.
Trip Spikes	Trip spike samples were to be prepared and analysed by the primary laboratory for BTEX. Analytical results to be within 80-120% recovery, indicating satisfactory sample transport and handling conditions were achieved.	One trip spike samples were collected during the investigation. All concentrations were reported as below the detection limits.

Task	Description	Project
Duplicates	Field duplicate samples were to be analysed as follows (as per NEPM): ▪ intra-laboratory duplicates at a rate of 1 in 20 primary samples; and ▪ inter-laboratory duplicates at a rate of 1 in 20 primary samples. Field and laboratory acceptable limits between 30-50% RPD as stated by AS4482.1–2005. RPDs that exceed this range may be considered acceptable where: ▪ Results are less than 10 times the limits of reporting (LOR); ▪ Results are less than 20 times the LOR and the RPD is less than 50%; or ▪ Heterogeneous materials or volatile compounds are encountered. Non-compliance is to be documented in the report and the sample re-analysed or a higher level conservatively adopted.	The required sampling density of 1 per 20 duplicated primary samples was achieved and sufficient for the investigation. Laboratory duplicates prepared and analysed. Minor non-conformance, with negligible effects on data use for interpretative purposes. Non-conformance was reported for metal (nickel, arsenic and zinc) and TRH (F2,F3,F4) concentrations for groundwater duplicates. This is likely due to the heterogeneous nature of groundwater. Field QC samples and calculated RPD values are presented the table at the end of this appendice. Copies of laboratory reports are included in **Appendix G**.
<u>Laboratory QA/QC</u>		
Laboratory Analysis	The laboratories selected are NATA accredited for the analytes selected and perform their own internal QA/QC programs.	Yes SGS - primary laboratory Envirolab - secondary laboratory Laboratory QA/QC analyses are included in **Appendix G.**
	Appropriate detection limits were used for the analyses to be undertaken.	Practical Quantitation Limits for all tested parameters during the investigation are presented in laboratory analytical reports in **Appendix G.**
Holding Times	Holding times are the maximum permissible elapsed time in days from the collection of the sample to its extraction and/or analysis. All extraction and analyses should be completed within standard guidelines.	Laboratory sample extraction, duplicate and analysis dates were outside the suggested criteria for nitrite, E. coli and Thermotolerant coliforms and Enterococci in Water, pH, turbidity and VOCs
Method Blanks	A method blank contains the reagents used to prepare the sample for final analysis. The purpose of this procedure is to identify contamination in the reagent materials and assess potential bias in the sample analysis due to contaminated reagents. The QC criterion aims to find no detectable contamination in the reagents. Each analysis procedure should be subject to a method blank analysis. The results of each should indicate that contaminants were not detected.	Yes

Task	Description	Project
Laboratory Duplicates	Laboratory duplicates are field samples that are split in the laboratory and subsequently analysed a number of times in the same batch. These sub-samples are selected by the laboratory to assess the accuracy and precision of the analytical method. The selected laboratories should undertake QA/QC procedures such as calibration standards, laboratory control samples, surrogates, reference materials, sample duplicates and matrix spikes. Intra-laboratory duplicates should be performed at a frequency of 1 per 10 samples.	Assessment of laboratory duplicates has been undertaken by the laboratory. All laboratory control standards were within acceptable ranges, with the exception of the following: Sample SE281818.002 (Toluene with 85% recovery) RPD failed acceptance criteria due to sample heterogeneity
Laboratory Control Standard	A laboratory control standard is a standard reference material used in preparing primary standards. The concentration should be equivalent to a mid-range standard to confirm the primary calibration. Laboratory control samples should be performed on a frequency of 1 per 20 samples or at least one per analytical run.	Assessment of laboratory control standard has been undertaken by the laboratory. All laboratory control standards were within acceptable ranges.
Matrix Spikes	Matric spikes are field samples to which a predetermined stock solution of known concentration has been added. The samples are then analysed for recovery of the known addition. Recoveries should be within the stated laboratory control limits of 70 to 130% and duplicates should have RPDs of less than 50%.	Assessment of matrix spikes has been undertaken by the laboratory. All data quality objectives were met.
Surrogate Spikes	Surrogate spikes provide a means of checking, for every analysis that no gross errors have occurred at any stage of the procedure leading to significant analyte loss. Recoveries should be within the stated laboratory control limits of 70 to 130%.	Assessment of surrogate spikes has been undertaken by the laboratory. All data quality objectives were met.
Conclusion	The QA/QC indicators should either all comply with the required standards or showed no variations that would have no significant effect on the quality of the data.	Assessment of the investigation QA/QC is presented in the following sections.

H1.2 Calculation of Relative Percentage Difference (RPD)

The RPD values were calculated using the following equation:

$$RPD = \frac{|C_O - C_R|}{[(C_O + C_R)/2]} \times 100$$

Where:

C_O = Concentration obtained for the primary sample; and

C_R = Concentration obtained for the blind replicate or split duplicate sample.

H2.1 Field QA/QC

Field QC Samples

The field (intra- / inter- laboratory) duplicate samples collected during the investigation are summarised in **Table H-2**. Inter-laboratory duplicates were analysed by the secondary laboratory, Envirolab.

Table H-2 Field QC Sampling Program

Matrix	Primary QA Sample	Duplicate (Primary Lab)	Triplicate (Secondary Lab)	Total Duplicates
Groundwater	GW-BH1M	GW_QD1	GW_QT1	2

H2.2 Field QC Summary

Review of the field data quality indicators is presented in **Table H-3** below.

Table H-3 Field Data Quality Indicators

QA Component	Data Quality Indicator(s)	Conformance
Accuracy – a quantitative measure of the closeness of reported data to the "true" value	SOPs appropriate and complied with	Yes
	Results for inter-laboratory (split field) duplicates acceptable	Yes
Precision – A quantitative measure of the variability (or reproducibility) of data	SOPs appropriate and complied with	Yes
	Results for intra-laboratory (blind field) duplicates acceptable	Yes
Completeness – A measure of the amount of useable data from a data collection activity	Each critical location sampled	Yes
	Samples collected at targeted locations and depth	Yes
	SAQP appropriate and complied with	Yes
	Experienced sampler	Yes
	Field documentation correct	Yes
Comparability – The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Same sampling method used on each occasion/location	Yes
	Experienced sampler	Yes
	Same type of samples collected (filtered, size, fractions)	Yes
Representativeness – The	Appropriate media sampled according to SAQP	Yes

QA Component	Data Quality Indicator(s)	Conformance
confidence (expressed qualitatively) that data are representative of each medium present onsite	Each media identified in SAQP sampled	Yes
	Appropriate sample collection methodologies, handling, storage and preservation techniques used	Yes

H2.3 Conclusion for the Field QA/QC

All field work, including equipment decontamination and sample preservation and transport, was conducted in general accordance with the SAQP, which were devised with reference to industry-approved guidelines. Appropriate QC measures were integrated into each sampling event and the DQIs were met.

All samples, including field QC samples, were transported to the primary and secondary laboratories under refrigerated conditions, using strict COC procedures. Relevant documents (COC forms) were presented with the samples at the times of delivery. All supporting documents (COCs and SRAs) were completed in full and signed, where appropriate. EI considered the field QA/QC program carried out during this investigation to be appropriate.

H2.4 Laboratory QA/QC

Laboratory Accreditation

Primary and intra-laboratory duplicate samples were analysed by SGS (located in Alexandria NSW), with inter-laboratory duplicate samples analysed by Envirolab (located in Chatswood NSW). All laboratories are accredited by NATA for the analyses undertaken.

Laboratory QC Summary

Review of the laboratory data quality indicators is presented in **Table H-4** below.

Table H-4 Laboratory Data Quality Indicators

DQI	Item	Conformance
Completeness A measure of the amount of useable data (expressed as %) from a data collection activity	All critical samples analysed according to SAQP and proposal	Yes
	All analytes analysed according to SAQP in proposal	Yes
	Appropriate methods and PQLs	Yes
	Sample documentation complete	Yes
	Sample holding times complied with	Part
Comparability The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event	Sample analytical methods used (including clean-up)	Yes
	Sample PQLs (justify/ quantify if different)	Yes
	Same laboratories (justify/ quantify if different)	Yes
	Same units (justify/ quantify if different)	Yes
Representativeness Confidence that data are representative of each media	All key samples analysed according to SAQP in the proposal	Yes

DQI	Item	Conformance
Precision A quantitative measure of the variability (or reproducibility) of data	Analysis of laboratory duplicates	Yes
	Analysis of field duplicates	Yes
	Analysis of laboratory-prepared volatile trip spikes	Yes
Accuracy A quantitative measure of the closeness of reported data to the true value	Analysis of field blanks	Yes
	Analysis of rinsate/ rinsate blanks	Yes
	Analysis of method blanks	Yes
	Analysis of matrix spikes (MS)	Yes
	Analysis of surrogate spikes	Yes
	Analysis of reference materials	Not applicable
	Analysis of laboratory control samples	Yes

H2.5 Conclusion for the Laboratory QA/QC

All contracted laboratories (SGS and Envirolab) were accredited by NATA for the analyses undertaken. All analytical procedures used were industry recognised and endorsed standard methods. Appropriate QC measures were integrated into each testing batch and the DQIs were met, or if not, the variability was suitably justified.

All final reports were submitted in full and included all requested analyses, as per the signed COC forms. EI considered the laboratory QA/QC programs carried out during this investigation to be appropriate.

H2.6 Summary of Project QA/QC

The sampling (including sample preservation, transport and decontamination procedures) and laboratory methods followed during this investigation were consistent with EI protocols. The project DQOs specified in **Section 3.4.1** were considered to have been achieved. The adopted QA/QC program ensured that the data collated during this report were accurate, precise and representative of the site condition. It was therefore considered that the data were sufficiently precise and accurate and that the results could be used for interpretative purposes.

Appendix I – DCR and Works Surrender Form

New water supply work and/or water use approvals

This guide is provided to assist you in completing the application for a new approval for water supply works, and/or water use approvals.

The application form must be completed in order to obtain a water use or water supply works approval under *Section 92 of the Water Management Act 2000* (WM Act).

This guide provides detailed explanations of each section and questions to help you fill in the application form. We recommend you read this carefully before completing the application form. However, if you require further assistance, email waterlicensing.servicedesk@dpie.nsw.gov.au.

What is a water supply work approval and water use approval?

Water supply work approvals allow you to construct and use a work which takes water from a river, lake or aquifer. Examples of water supply works are water pumps, water bores, dams, weirs, irrigation channels, banks and levees.

Water use approvals allow you to use water on your land. Examples of water uses which require approval are irrigation, town water supply and power generation.

Water supply work approvals and water use approvals may be granted at the same time and specified in a single approval document called a combined approval. This commonly occurs where applications for these approvals are made at the same time and relate to the same property.

If you want to apply for approval for water supply works and water use on different properties, you will need to make separate applications. Only works on contiguous lots may be nominated on the same application.

Do I need an approval?

You need a water supply work approval to construct and use a water supply work unless an exemption applies.

It is an offence to construct and use a water supply work without an approval. It is also an offence to construct and use a water supply work in a manner which does not comply with the terms and conditions of an approval.

You need a water use approval to use water for a particular purpose at a particular location unless an exemption applies.

It is an offence to use water without an approval. It is also an offence to use water in a manner which does not comply with the terms and conditions of an approval.

INT22/93629

What are the exemptions?

For information about exemptions, go to www.water.dpie.nsw.gov.au/licensing-and-trade/licensing/water-licensing-and-works-approvals-exemptions.

Can my approval be amended?

You can apply to amend your water supply work approval and/or water use approval by altering, removing, adding or reducing any of the water supply works, uses or land specified in the approval. For amendments to an existing approval complete the *Amend a water supply work and/or water use approval* application form.

How to use this guide

Use this guide to assist you in completing the application form for a *New water supply work and/or water use approval*.

The application forms have several parts (relating to the type of approval sought) and sections which are divided into a series of questions. In each section the questions are identified by a number on the left-hand side of the form—for example, B4 is question 4 in section B. The information provided in the guide corresponds to these numbers in the application form.

Ensure you provide all the information requested in the application form. If your application form is incomplete, it will not be accepted. Note, we may contact you to request further information in relation to your application.

General instructions

To make sure that your application is processed efficiently, please note these general instructions:

Use BLOCK letters as they are easier to read.

If there is not enough space on the form for all your information, complete the answer on a separate sheet of paper and attach it to the application form (include a reference to the attachment in the application form).

Ensure that you fully complete the form as all the information is necessary to verify and process your application — it may be rejected if all the required information is not provided.

Do not write credit card details on this form — we will contact you for payment.

Sections in application form

Requirements for water supply work approval application

The following information is required to support applications for the amendment of existing water supply work approvals. Links have been provided to assist you.

Failure to provide the requested information may result in your application being refused to be assessed.

- detailed design drawings of proposed works, including survey plans and cross sections
- copy of proposed pumping regime (timetable)
- map indicating
  - location of property (including landmarks and north indicator), with clearly defined property boundary
  - location(s) (including coordinates) of all existing works as well as works proposed in this application
  - watercourses and wetlands (including dry riverbeds and temporary wetlands)
  - extent of any native vegetation on the property (including native grasses)

  Use the department's *Waterfront land e-tool* to identify any waterfront land on or near the property: https://water.dpie.nsw.gov.au/licensing-and-trade/approvals/controlled-activity-approvals/what/guidelines
- any known Aboriginal or European cultural heritage features on the property — search results and mapped locations
  - use the Aboriginal Heritage Information Management System (AHIMS) Web Services to identify any Aboriginal heritage features on the property: www.environment.nsw.gov.au/awssapp/Login.aspx?ReturnUrl=%2fawssapp
  - search the State Heritage Inventory for NSW heritage: www.heritage.nsw.gov.au/search-for-heritage/search-for-nsw-heritage
- records of any threatened species on the property — search results and mapped locations
  - use the NSW BioNet Atlas search to identify any threatened species: https://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx
- records of any protected species within a 1-kilometre radius of the proposed work location — search results and mapped locations
  - use the Australian Government Protected Matters Search Tool to identify any protected species within a 1 km radius of the proposed work location: www.awe.gov.au/environment/epbc/protected-matters-search-tool
- details of any contaminated sites on or near the property — search results and mapped locations

  - use the Environmental Protection Authority public register contaminated land record of notices to identify any contaminated sites: https://apps.epa.nsw.gov.au/prclmapp/searchregister.aspx
- details of any exploration or mining titles on or near the property — search results and mapped locations
  - use the Regional NSW Mining, Exploration & Geoscience MinView search to identify any exploration or mining titles on or near the property: https://minview.geoscience.nsw.gov.au/#/?lon=149.6275&lat=-33.31457&a=10&bm=bm3&l=ti14:y:100,til3:y:100,ti0:y:100,ap0y:100,pt6:y:100,pt5:y:100,pt4:y:100,pt3:y:100,pt2:y:100,pt1:y:100,mt6:y:100,mt5:y:100,mt4:y:100,mt3:y:100,mt2:y:100,mt1:y:100
- acid sulphate soils assessment and management report (if acid sulphate soils present at site).

Additional requirements for dewatering applications

Applications for dewatering require technical assessment from the department unless it is deemed that your project is classed as low risk and small scale.

The impact statements, hydrogeology report and Dewatering Management Plan must include the following information:

- proposed volume of take
- a detailed explanation and evidence to demonstrate the suitability of the volume estimation method
- the ground elevation across the site on a survey plan or detailed in other supporting documents
- a characterisation of the ground conditions based on site-specific intrusive investigations
- water level measurements
- the magnitude of required drawdown in water level to achieve dry conditions in the excavation
- the works proposed to be used for dewatering, described in detail (number, spacing, depth, individual discharge rates, cumulative discharge rate) and illustrated on specific plan and section diagrams
- the base level of the aquifer, preferably including bore logs
- accurate excavation footprint dimensions (length, width, bulk excavation level)
- field test results to determine the hydraulic conductivity of the lithological units present beneath the site
- the anticipated duration of dewatering pumping
- the depth of piling embedment beneath the bulk excavation level (where applicable).

For low risk, small scale dewatering works, you may submit your application without the additional information requirements for dewatering. The department will request this information from you if required.

Information relating to proposed use of water

To determine whether or not you are exempt from a water use approval visit the department's website: https://water.dpie.nsw.gov.au/licensing-and-trade/licensing/water-licensing-and-works-approvals-exemptions.

PART 1 — Applicant details

Part 1 must be completed.

Section A: Applicant details

In this section provide the details of the applicant/s for the approval.

A1-4 The name can be a person's name or the name of a legal entity, such as a company or corporation, that is either the owner or legal occupier of the land to which the application relates. If the application is made by a company or corporation do not answer A1-A3.

A5 Insert the Australian Company Number (ACN) if the application is by a company.

A6 Insert the position of the person/s who is/are making the application for and on behalf of the company or corporation. If the applicant is a company this would be either a company director or company secretary. If the applicant is a corporation this would be the duly authorised officer.

A7-11 Insert the address of the applicant. For companies or corporations, insert the address details of the registered office.

A12-14 Insert the contact details for the applicant.

A15-22 There can be more than one holder of an approval. The form makes provision for two applicants to apply. If there are more than two applicants, photocopy/print multiple copies of the blank Section A, complete it and attach it to the form.

A23 This is the total number of applicants listed on the application form and includes applicants listed on any additional pages.

Section B: Contact person for application

If there is only one applicant, you do not need to complete this section.

If there is more than one applicant, and this section has not been completed, we will assume that the first applicant on the form is the application contact and contact that person, if necessary, prior to the determination of the application.

An application contact is not legally delegated by the applicant/s to act on their behalf.

An application contact may be an applicant or a third party such as a solicitor, farm manager or water broker.

B1-11 Insert the name and contact details of the application contact. This will assist us should we need to contact someone to discuss the details of the application.

Section C: Land ownership of the works site and lands to be supplied

Specify whether the application is made by the owners of the land or the lawful occupiers of the land.

If you do not own the land, but you anticipate that you will own the land within a reasonable period of the date of application, attach an explanation of anticipated ownership together with documentary evidence.

An owner of land is any person with freehold title to land.

To permit you to carry out the activities to be authorised by the approval, the term lawful occupation includes:

- an easement
- a power arising under legislation
- an agreement or other legally binding permission with the owner (e.g. a lease, a permissive occupancy or enclosure permit).

The agreement may be a specific authorisation or an appropriate clause in a general authority such as a lease.

You must attach a copy of the relevant documentation, which includes:

- a letter from the owner authorising your occupation of the land to which the approval would apply
- evidence of an easement, a power arising under legislation or an agreement or other legally binding permission with the owner (e.g., lease, a permissive occupancy or enclosure permit).

Other — this could be if you are applying as a major utility, irrigation corporation, private irrigation board, private drainage board or private water trust, or as permissive occupancy.

All owners of the land or lawful occupiers, or their legal representative, must sign this application form.

Section D: Other approvals

D1-D3 If your proposal has been granted consent from your local council, provide the consent number in D3.

D4 If an environmental impact assessment has been undertaken, you are required to attach a copy of the assessment with the application.

D5 If your proposal is considered a State Significant Development or major project, provide the consent number in D5.

D6-D8 You may require a separate approval or a property vegetation plan under the *Native Vegetation Act 2003* if your proposal involves clearing. If native vegetation clearing consent has been granted, provide the consent number.

Section E: Pre-application discussion

If you have participated in a pre-application discussion with an officer from the department, disclose the name of the officer and date of the discussion on the application form.

PART 2 — Water supply work approval

PART 2A: Work details

If you are applying for a water supply work approval, complete the relevant sections F to J for all new water supply work/s approvals. Part 2B must also be completed.

If you are seeking approval for more than one of each type of work, duplicate and complete the relevant page and attach to your application. Only works on contiguous lots can be applied for on the same approval.

Note: In some of the sections below, there are questions relating to rivers. 'River' is defined in the WM Act to include:

- any water source, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and
- any tributary, branch or other watercourse into or from which a water course referred to in paragraph (a) flows, and
- anything declared by the regulations to be a river.

Mandatory metering conditions will apply to water supply works that meet infrastructure size thresholds.

It is not necessary to hold a water access licence in order to apply for a water supply work approval. However, it is recommended that you check licence availability before making an application if you are in doubt.

For information about exemptions, go to https://water.dpie.nsw.gov.au/licensing-and-trade/licensing/water-licensing-and-works-approvals-exemptions.

Section F: Extraction works — groundwater only

If you are seeking approval for more than one groundwater work, duplicate Section F and attach the completed extra page(s). Only works on contiguous lots and within the same water source can be applied for on the same approval.

F1-3 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

F4 For type of work see list of works at the end of this guide.

F5 Specify whether your approval is ongoing or fixed term. For some purposes of work, length of approval can determine whether advertising is required. See Part 3 Division 1 Clause 26 'Advertising of applications for approvals' in Water Management (General) Regulation 2018 for further information. Standard advertising is 28 days.

F6-18 Provide details of proposed work. All questions must be answered.

F19-28 The department needs to check that your proposed work will not extract from a river, damage a wetland, interfere with a neighbour's bore or extract contaminated groundwater.

F29-30 For bores, the proposed work must be carried out by a licenced bore driller. For dewatering, a Dewatering Management Plan is required.

Section G: Pump(s) — surface water only

If you are seeking approval for more than one surface water pump, duplicate Section G and attach the completed extra page(s). Only works on contiguous lots can be applied for on the same approval.

G1-4 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

G5 Specify whether your approval is ongoing or fixed term. For some purposes of work, length of approval can determine whether advertising is required. See Part 3 Division 1 Clause 26 'Advertising of applications for approvals' in Water Management (General) Regulation 2018 for further information. Standard advertising is 28 days.

G6-21 Provide details of proposed work. All questions must be answered.

Section H: Channel(s) for diverting or conveying water, regulator(s) or pipes

If you are seeking approval for more than one channel, regulator or pipe works, duplicate Section H and attach the completed extra page(s). Only works on contiguous lots can be applied for on the same approval.

H1-3 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

H4 For type of work see list of works at the end of this guide.

H5-16 Provide details of proposed work. All questions must be answered.

Section I: Storage works — off river

If you are seeking approval for more than one off-river or runoff harvesting storage works, duplicate Section I and attach the completed extra page(s). Only works on contiguous lots can be applied for on the same approval.

I1-3 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

I4-5 For type of work see list of works at the end of this guide.

I6-8 Provide location details of proposed work. All questions must be answered.

I9 If the proposed work is to be on a floodplain, it may cause the redistribution of flood flows, which may have adverse environmental impacts and adversely affect surrounding landholders. We are required to assess these aspects and may require you to redesign your proposal to mitigate any potential impacts.

I10-16 Provide size and dimension details of the work. All questions must be answered. Refer to information on farm dams for a method of calculating storage capacity at https://www.waternsw.com.au/.

Section J: Storage works — in river storage only (e.g., weirs)

If you are seeking approval for more than one in-river storage work, duplicate Section J and attach the completed extra page(s). Only works on contiguous lots can be applied for on the same approval.

J1-3 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

J4 For type of work see list of works at the end of this guide.

J5-17 Provide details of proposed work. All questions must be answered. Refer to information on farm dams for a method of calculating storage capacity at https://www.waternsw.com.au/.

J10 If the proposed work is to be on a floodplain, it may cause the redistribution of flood flows, which may have adverse environmental impacts and adversely affect surrounding landholders. We are required to assess these aspects and may require you to redesign your proposal to mitigate any potential impacts.

PART 2B: Potential environmental impacts of the water supply work(s)

Section K: Impact statement

Part 2 Section K must be completed for all water supply work applications.

K1 You are required to advise of any listed features/characteristics present at the site of the proposed water supply work.

K2 Design and construction plans and a detailed map are required to demonstrate the proposed extent of disturbances to soil and vegetation. For applications related to dewatering in existing excavation this question is not applicable.

K3 Contamination status of the property is required to assess the impact of the proposed work. For dewatering — if it is deemed that your project is classed as low risk and small scale you may submit your application without the general quality characteristics of the groundwater beneath the site. The department will request this information if required.

K4 If geotechnical investigations have been undertaken at the site you are required to include the report with the application.

K5 If acid sulphate soils are present at the site, an Acid Sulphate Soil Management Plan must be provided with the application.

The information you provide will assist us to undertake an assessment of likely impacts of the water supply work approval/s.

Depending on the size of your proposal and its potential impacts, you may also be required to provide:

- a Species Impact Statement (if your proposal has potential impacts on threatened species under the *Threatened Species Conservation Act 1995*)
- a surveyed plan showing the proposed layout, dimensions and construction details of the work/s
- any other additional information about your proposal, as required.

If your proposed activity is a water supply work and it involves clearing of native vegetation, you do not have to get separate approval under the *Native Vegetation Act 2003*. You may, however, require a separate approval or a property vegetation plan under the *Native Vegetation Act 2003* if your proposed activity is water use and it involves clearing at the proposed site of the water use.

PART 3 — Water use approval

PART 3A: Use details

Complete Part 3 if you a use approval is required

If you are applying for a Water Use Approval, complete sections L to P. Part 3B must also be completed.

Section L: Purpose

L1-2 Nominate the purpose you are seeking approval for.

L3-5 A current and relevant water access licence is a water access licence that is approved in the same water source and for the same purpose as the proposed water supply work.

Section M: Location of land where water will be used

Provide the location of the water use approval and the river location to allow references to relevant planning policies that apply to the area.

If the proposal will be located on more than one property, please mark them all clearly on a map and provide property details such as lot number etc. for each.

Section N: Water use proposal

If the water is to be used for irrigation complete the table. For other purposes provide details of the proposed use in the space provided.

Section O: Soils

For complex or potentially high impact proposals, you may be required to provide a soil survey.

Section P: Drainage management

Complete section P for irrigation only.

PART 3B: Potential environmental impacts of the water use

Section Q: Impact statement

Part 3 Section Q must be completed for all water use applications.

Q1 You are required to advise of any listed features/characteristics present at the site of the proposed water use.

Q2 Design and construction plans and a detailed map are required to demonstrate the proposed extent of disturbances to soil and vegetation.

Q3 Contamination status of the property is required to assess the impact of the proposed use of water.

Q4 If geotechnical investigations have been undertaken at the site you are required to include the report with the application.

Q5 If acid sulphate soils are present at the site, an Acid Sulphate Soil Management Plan must be provided with the application.

The information you provide will assist us to undertake an assessment of likely impacts of the water use.

Depending on the size of your proposal and its potential impacts, you may also be required to provide:

- a Species Impact Statement (if your proposal has potential impacts on threatened species under the *Threatened Species Conservation Act 1995*)
- a surveyed plan showing the proposed layout, dimensions and construction details of the work/s
- any other additional information about your proposal, as required.

You may require a separate approval or a property vegetation plan under the *Native Vegetation Act 2003* if your proposed activity is water use and it involves clearing at the proposed site of the water use.

PART 4 — Declaration and application fee

Part 4 must be completed.

Section R: Declaration of applicants

Ensure you understand your legal obligations before signing this document. You may need to obtain independent legal advice for this.

Each applicant must provide their name, sign the completed form and write the date it was signed.

If the applicant is a company, the application is to be signed for and on behalf of the applicant by two persons in accordance with Section 127 of the *Corporations Act 2001* (Cth). Select the position of the signatories which can be a company director or company secretary.

If the applicant is a corporation, insert the name of the corporation, select the position of the signatory, and ensure the application is signed by the duly authorised officer.

Section S: Payment of application

Specify how you would like to pay the application fee. An officer from the department will contact the nominated payee for payment.

List of works

Each of the sections in Part 2A requires the 'Type of work' to be entered. Select from the 'type of work' listed under each of the work categories.

Table 1. Type of works required in Part 2A

Type of work	Specific type	
Section F: Extraction works — groundwater	• bore • test bore • pump (in excavation) • spearpoints	• excavation • well • artesian well • collector system
Section G: Pump(s) — surface water only	• axial flow • centrifugal • mixed flow • force • piston • mono • submersible	• pumping plant • pumping station • stand by pump • helical rotor • windmill • hydraulic ram • spearpoints
Section H: Channel(s) — for diverting or conveying water, regulator(s) or pipes	• cutting • channel • channel — above ground • channel — below ground	• regulator • water race • pipeline
Section I: Storage work(s) — off-river and runoff harvesting storages only (e.g. on-farm dams, turkeys nest dams)	• bywash dam • bywash dam and cutting • earthen dam and pipe spillway • block dam with training walls	• recirculation storages • groundwater storages (e.g. tanks, dam) • excavated tank
Section J: Storage works — in-rover storage only (e.g. weirs)	• block dam • block dam and diversion pipe • block dam and regulator • block dam with training walls • earthen dam and pipe spillway • earth fill dam/spillway/radial gate and emergency spillway	• overshot dam • overshot dam and diversion pipe barrage • bywash dam • bywash dam and cutting • block dam with bywash • weir

Appendix J – Noise and Vibration Assessment

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

37 ARCHER STREET, CHATSWOOD

Noise and Vibration Assessment for SSDA (SSD-73277714)

8 May 2025

Hyecorp

TP197-01F02 Noise and Vibration Assessment for SSDA (r1)

40 YEARS 1982-2022 ACOUSTIC ENGINEERING EXCELLENCE

Sydney Melbourne Brisbane Gold Coast Kuwait Singapore
Renzo Tonin & Associates ABN 29 117 462 861
Level 1/418A Elizabeth St SURRY HILLS NSW 2010 | PO Box 877 STRAWBERRY HILLS NSW 2012
P (02) 8218 0500 F (02) 8218 0501 sydney@renzotonin.com.au www.renzotonin.com.au

Document details

Detail	Reference
Doc reference:	TP197-01F02 Noise and Vibration Assessment for SSDA (r1)
Prepared for:	Hyecorp
Address:	Heritage House, 256 Victoria Avenue, Chatswood NSW 2067
Attention:	Norelle Jones

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
20.02.2025	Draft issue	0	0	R Corbett		
7.5.2025	Issue as final		1	R Corbett		
File Path: C:\Users\rebecca.corbett.RTAGROUP\Documents\TP197-01F02 Noise and Vibration Assessment for SSDA (r1).docx						

Contents

List of tables

List of figures

1 Introduction

Renzo Tonin & Associates was engaged to undertake a Noise Impact Assessment for a proposed mixed-use development with affordable housing in-fill at 37 Archer Street, Chatswood.

The application seeks consent for the demolition of existing structures on the site and the development of a residential apartments (including affordable housing), commercial office space, food and beverage uses and retail tenancies with servicing areas and parking contained within the building's basement. A publicly accessible through site-link is also proposed providing a direct connection between Archer and Bertram Streets and allowing opportunities for outdoor dining and passive recreation.

Specifically, the SSDA seeks development consent for:

- Demolition of existing buildings, structures and trees.
- Excavation of the site to a basement depth of RL RL71.85mm.
- Construction of a mixed-use building to 28 storeys (RL184.25m) comprising residential and commercial uses.
- The development of 125 apartments (including 28 affordable housing units) with residential amenities and services, commercial office space, food and beverage tenancies and retail uses.

The proposal is for a 28-storey building with 6-levels of basement below. The development contains the following uses:

- Residential apartments: A total of 125 apartments (including 28 affordable housing units) comprising 29 x 1 bed apartments, 55 x 2 bed apartments, 30 x 3 bed apartments and 11 x 4 bed apartments with recreational facilities at Level 8.
- Office tenancies: occupying levels 2 and 3.
- Retail tenancies: double storey retail units fronting Bertram Street.
- Food and beverage tenancies: ground level.
- Basement parking: 154 car spaces, 9 motorbike spaces, 28 bicycle spaces and end of trip facilities.
- Servicing and plant equipment.
- Publicly accessible landscaped through site link.
- The gross floor area (GFA) for the proposed development is described below:
- Total GFA: 14,230sqm
- Residential GFA: 12,318sqm
- Non-residential GFA: 1,912sqm

Affordable housing will be provided in the form of a monetary contribution and floorspace within the proposed development.

The purpose of the project is to provide a high-quality mixed-use development in an accessible location within the Chatswood CBD, providing new market and affordable housing opportunities complemented by commercial and retail uses within this well serviced location.

This noise and vibration impact assessment investigates the effects of external noise and vibration intrusion onto the development site from road traffic (Archer Street – classified road). The advice is based on a detailed study of noise and vibration measurements on the site using both long term logging and attended measurements.

In addition:

- This report will identify operational noise goals and provide in-principle examination of noise emission from the site.

- This report will provide an assessment of noise and vibration created during the construction phase of the development.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 12 July 2024 and issued for the SSDA (SSD-73277714). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

SEAR 12, relates to acoustics, and states:

Table 1: SEARs Requirements

Item	Description Requirement	Section Reference
Sear 12	Provide a noise and vibration assessment prepared in accordance with the relevant NSW Environment Protection Authority (EPA) Guidelines. The assessment must detail construction and operational noise and vibration impacts on nearby sensitive receivers and structures and outline the proposed management and mitigation measures that would be implemented.	SEPP Transport and Infrastructure and Development Near Rail Corridors and Busy Roads – Sections 4 and 5 EPA Noise Policy for Industry (operational noise emissions) – Section 6. EPA Interim Construction Noise Guidelines (construciton noise vibration) – Section 7.

The report is based on architectural plans from Fuse Architects issued for SSDA on 24th April 2025.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

Appendix A contains a glossary of acoustic terms used in this report.

2 Site description

The site is located at 37 Archer Street, Chatswood within the Willoughby Local Government Area (LGA). The site is legally described as SP 38065 and has an area of 2,201m^2. The existing development includes two buildings (multi-unit housing) of up to three storeys in height which accommodate a total of 14 dwellings. The existing development includes an inground swimming pool fronting Archer Street and single level of basement parking which is accessed from Bertram Street. Pedestrian entries are available from Bertram and Archer Street. Vegetation within the site includes planter boxes through the central circulation spaces and established trees around the site's perimeter. Street trees, comprising native species, along the site's western frontage form part of an attractive and distinctive avenue of trees.

The site is situated on the southern edge of the Chatswood CBD. The immediately surrounding area has been zoned for more intensive development and is intended to support mixed use development including high density residential uses. The existing character of the area is evolving.
The urban context surrounding the site is characterised by a mix of residential, commercial, and retail uses. The surrounding locality is described below:

North: The site is bounded to the north by low scale residential development including townhouses and single dwelling properties. This land is zoned to support high-rise mixed use development including buildings with heights up to RL246.8m. Along Archer Street proposals for mixed use towers have been lodged for properties at 51-55 Archer Street and 57-61 Archer Street.

East: The site is bound to the east by Bertram Street which comprises a two-way local road and borders the western edge of the South Chatswood Heritage Conservation Area. A locally listed heritage item at 34 Neridah Street is situated directly opposite.

South: A development application for a 14-storey mixed use development has been lodged for 31-44 Archer Street which is situated immediately to the south of the site. This area provides a transition to low scale residential uses contained within the South Willoughby Conservation Area located on the southern side of Johnson Street. There is a locally significant heritage item at 27 Archer Street.

West: To the west the site is bound by Archer Street which comprises a four-lane classified road. Existing development on Archer Street comprises medium density residential towers of 7 storeys and higher. The area has been zoned for taller buildings of up to 90m. Further to the west is the Chatswood transport interchange and Pacific Highway, linking to the CBD and wider Greater Sydney region.

The site benefits from excellent access to public and active transport and is within walking distance of the Chatswood Interchange, which provides rail and metro connections to North Sydney, Macquarie Park, and the Sydney CBD. Bus services run along Archer Street and provide connections to Chatswood and Crows Nest.

An aerial photograph showing the site and surrounds is presented below.

Figure 1 – site location and surrounds

3 External noise intrusion criteria

3.1 Road Traffic Noise Criteria

The Standards, Government Policies, Guidelines and Council Development Control Plans (DCP) relevant to this development are as follows:

1. Willoughby City Council Development Control Plan 2023
2. State Environment Planning Policy (Transport & Infrastructure) or SEPP T&I 2021
3. Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008
4. Australian Standard AS/NZS 2107:2016 "Acoustics – Recommended design sound pressure levels and reverberation times for building interior"

Archer and Bertram Streets are not identified as roads requiring a mandatory assessment on the Service NSW Traffic Volume Maps for SEPP in accordance with the State Environment Planning Policy (Transport & Infrastructure) and the Department of Planning's Guideline, however, Archer Street is identified as a classified road, and Willoughby City Council's DCP 2023 reference to the State Environmental Planning Policy (Transport & Infrastructure) 2021, the acoustic criteria is Clause 2.120 and the Department of Planning's Interim guideline are considered the most appropriate for this site. The relevant criteria is outlined in Table 2 below.

Table 2: Recommended Maximum Internal Traffic Noise Level

Type of Occupancy	Windows Condition	Maximum Design Noise Level	
		Day[2], L_{Aeq} (15hour)	Night[2], L_{Aeq} (9hour)
Bedrooms	Closed	-	35dB(A)
Open-plan Living/Dining/Kitchen including studies	Closed	40dB(A)	40dB(A)
Lobby[1]	Closed	50dB(A)	-
Retail tenancies[1]	Closed	50dB(A)	-
Commercial (general office areas)	Closed	45dB(A)	

Notes:

1. Occupancies not covered under SEPP (T&I) are based on Australia Standard AS2107 "Acoustics – Recommended design sound pressure levels and reverberation times for building interior"

2. Day is defined as 7am to 10pm. Night is defined as 10pm to 7am next day.

Relevant sections of the SEPP (T&I), Department of Planning Documentation and Council DCP are presented in Appendix B of this report. Results of the background and ambient noise monitoring conducted on site are presented in Appendix C.

4 Measured and predicted noise levels

4.1 Noise and Vibration Surveys

4.1.1 Long-term Noise Survey

One unattended long-term noise monitor was installed on site from Wednesday 5th February to Wednesday 12th February 2025 to determine the existing level of ambient and background noise surrounding the site. The monitor was positioned at the centre of the site of the existing residences 37 Archer Street, Chatswood.

The noise logger records noise levels on a continuous basis and stores data every fifteen minutes. The noise logger was calibrated before and after measurements and no significant deviation in calibration was noted. The noise monitoring equipment used here complies with Australian Standard 1259.2-1990 "Acoustics - Sound Level Meters" and is designated as Type 2 instruments suitable for field use.

The dates of measurement and the results obtained from the logger survey are shown in Appendix C.

4.1.2 Short term traffic noise survey

Short term measurements were also undertaken at the midpoint of the Archer Street and Bertram Street boundaries of the proposed development at ground level in order to determine traffic noise impacts on the site on Wednesday 12th February, 2025. The locations are shown in Figure 1.

4.1.3 Road traffic noise

The traffic noise levels have been taken from the representative $L_{Aeq(15/9hr)}$ for the week for both daytime (7am to 10pm) and night-time (10pm to 7am) periods. The design noise levels are presented below.

Table 3: Representative day and night traffic noise levels

Location	Period	Predicted traffic Noise Level $L_{Aeq,\,T}$ [1,2] at the Worst Affected Facade
Archer Street facade	Day time (7am to 10pm)	63 dB(A)
	Night time (10pm to 7am)	56 dB(A)
Bertram Street facade	Day time (7am to 10pm)	58 dB(A)
	Night time (10pm to 7am)	50 dB(A)

Notes:

Noise levels presented are façade corrected values.

Representative external noise levels, LAeq over 15 hour and 9 hour day and night period respectively,

Noise measurement data was then used to create a 3D noise model for the site to determine noise levels across all facades and levels within the proposed development.

4.1.4 Background noise

Table 4 below presents the results of the long-term unattended noise monitoring for background noise.

Table 4: Background noise levels from long-term noise monitoring

Noise Monitoring		Representative Background Noise Levels in dB(A)	Day[1]	Evening[2]	Night[3]
Location	Duration				
L1 - Noise monitor on existing driveway approx. 23m from Archer St curb	5-12 February 2025	L_{A90}	43	42	38
		L_{Aeq}	56	55	48

Notes:

Day, Evening & Night assessment periods are defined in accordance NSW EPA's Noise Policy for Industry as follows.

1. Day is defined as 7:00am to 6:00pm, Monday to Saturday; 8:00am to 6:00pm Sundays & Public Holidays.
2. Evening is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays
3. Night is defined as 10:00pm to 7:00am, Monday to Saturday; 10:00pm to 8:00am Sundays & Public Holidays

5 External Noise Control Recommendations

5.1 Glazing

To achieve the criteria outlined in Table 1 with windows closed, the following table presents the recommended glazing acoustic performances for the proposed development.

Table 5: Recommended acoustic performance of glazing assembly

Facade	Level(s)	Occupancy	Required Acoustic Rating of Glazing Assembly, Rw
Western façade facing Archer Street	Level 3-27	Apartment Bedrooms	Rw 32
		Apartment Living Areas	Rw 32
Eastern façade facing Bertram Street	Level 2-27	Apartment Bedrooms	Rw 28
		Apartment Living Areas	Rw 28
Northern facade	Level 2-27	Apartment Bedrooms	Rw 28
		Apartment Living Areas	Rw 28
Southern facade	Level 2-27	Apartment Bedrooms	Rw 28
		Apartment Living Areas	Rw 28

Notes:

The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions. The advice provided here is in respect of acoustics only.

The information in this table is provided for the purpose of approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant.

The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.

Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the form of construction where only an "estimate" is available for the sound insulation properties of recommended materials.

The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site.

All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced.

The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

Indicative Rw values for façade elements as follows:

- 6mm glass or 6mm/12mm airgap/6mm insulated glazed unit – Rw 28.
- 6.38mm laminated glass or 6mm/12mm airgap/6.38mm insulated glazed unit.– Rw 32

For all glazing systems, it is necessary to ensure that the acoustic performance of the window/sliding door frame does not downrate the acoustic performance of the glass. All operable window/door elements requiring an R_w rating of 30 are to have acoustic seals (equal to q-lon).

5.1.1 External Walls and Roof

External walls and roof are assumed to be masonry. If light weight external wall elements are used, these need to be reviewed in detail and may also impact the glazing requirements for that room (as the cumulative result of noise through window and external wall element needs to be considered).

5.1.2 Supplementary Ventilation

In accordance with the Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008:

If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia

However, the Department of Planning's Apartment Design Guide, July 2015 Objective 4B-1 requires that all habitable rooms are naturally ventilated, within an apartment complex.

Section 4J, *Noise and Pollution*, of the Apartment Design Guide nominates design solutions that may assist with delivering both the natural ventilation requirements and the internal noise levels (windows open) through careful design solutions. These may include wintergardens with operable facades, partially shielded and insulated balconies, building design and orientation, apartment setbacks and selection of acoustic materials for the building construction. An outside air intake for the air conditioning system may also be a solution to providing natural ventilation.

It has long been industry standard to assume a 10dB loss of noise from external to internal through an opened window in a building facade. It is based on the average results of a number of test cases, experimental data and published papers. This assumption has been well documented in The Roads and Traffic Authority (RTA) publications, including the RTA's Environmental Noise Management Manual (ENMM), Table 4.2.

Recent studies on noise reduction through facades with open windows[1] have shown that noise transmission through an open window can vary greatly based on the construction of the facades and noise flanking paths, including exposed floors and roof constructions.

The study indicates that noise loss through an open window of a development consisting of masonry construction with no exposed flooring and a concrete roof will be in the range of 11-15dB.

Based on these assumptions, the windows opened criteria can be met within habitable rooms on all facades.

[1] Ryan, Lanchester and Pugh, 2011

6 Noise Emission Assessment

There are no specific noise emission goals for the site set out in the Willoughby Council's DCP. In the absence of this, the EPA Noise Policy for Industry is the most commonly adopted noise emission guideline for plant and equipment.

For commercial/retail/cafe tenancies, if proposed:

- In the event there was a retail tenant proposing a licenced premises, patron/music noise would be subject to Office of Liquor and Gaming acoustic criteria.

6.1 Criteria - EPA Noise Policy for Industry

The NSW Environment Protection Authority (EPA) sets out noise criteria in its Noise Policy for Industry (NPfI) to control the noise emission from industrial sources.

The NPfI sets noise emission goals based on two sets of acoustic criteria:

- Intrusive criteria and
- Amenity Criteria

6.1.1 Intrusiveness Criteria

These criteria require that industrial noise does not exceed the background noise level by an excessive margin, preventing significant changes in the noise characteristic pertinent to the development site and surrounds. This is commonly referred to as the 'background plus 5' criterion. That is, the noise level from new industrial development, assessed in periods of 15 minutes, should not exceed the existing background noise level (measured in the absence of that development) by more than 5dB(A).

Based on the background noise levels presented in section 3, the intrusiveness criteria are as follows:

Table 6: Noise Policy for Industry - Intrusiveness Noise Criteria

Receiver	Time of day	Rating Background Noise Level (dB(A)L_{90})	Intrusiveness Noise Criteria (dB(A)$L_{eq(15min)}$)
Residences	Day	43	48
	Evening	42	47
	Night	38	43

6.1.2 Amenity and Project Amenity Criteria

Amenity criteria serve primarily to avoid "noise creep" – for example, if a number of industrial noise sources are permitted to increase the background noise level by 5dB(A) (as permitted by the Intrusiveness Criteria) there would be a point where the cumulative noise level is unacceptable.

A limit on the ultimate acceptable noise level is therefore included in the NPfI as a way of ensuring that cumulative noise impact from industrial growth is curtailed. This limit is set using the Amenity and Project Amenity Criteria. These criteria are determined with reference to ambient noise conditions and the land use of nearby development (residential, commercial, industrial etc).

The Amenity Noise Level is found in table 2.2 of the Noise Policy for Industry.

It is the *Project* Amenity Criteria that sets a site-specific noise emission goal for a development. The Project Amenity Noise Level is typically 2dB(A) below the Amenity Noise level unless there is an exception (discussed in more detail after the following table).

Table 7: Noise Policy for Industry - Amenity and Project Amenity Noise Levels

Receiver	Noise amenity area	Time of day	Amenity Noise Level dB(A)$L_{eq(Period)}$	Project (Site Specific) Amenity Noise Level dB(A)$L_{eq(15min)}$
Residential	Urban	Day	55	53
		Evening	45	43
		Night	40	38
School classroom - internal	All	Noisiest 1 hour period when in use	35	35 (45 external at the façade assuming windows open)

Notes:

- Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
- On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am.
- The LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.
- The Project Amenity Noise Level is typically 2dB(A) below Recommended Amenity Noise Level, unless there is an exception, as detailed below.
- * Project Amenity noise goal adjusted given high traffic noise levels (Traffic Noise Level – 15dB(A))

6.1.3 Maximum noise level event assessment

The potential for sleep disturbance from maximum noise level events, from the proposed development, needs to be considered. Section 2.5 of the NPfI provides sleep disturbance trigger levels, summarised as shown in the table below.

Table 8: Sleep disturbance criteria

Receiver	Sleep Disturbance Trigger Levels, 10:00pm to 7:00am	
	$L_{Aeq,\ 15\ minute}$	L_{AFmax}
All residential	Greater than 40dB(A) or RBL plus 5dB, whichever is the greater	52dB(A) or RBL plus 15dB, whichever is the greater

On applying the on-site measured background noise levels, the triggers are as follows:

Table 9: Sleep disturbance noise trigger levels

Receiver	Sleep Disturbance Trigger Levels, 10:00pm to 7:00am	
	$L_{Aeq,\ 15\ minute}$	L_{AFmax}
Residential premises surrounding site	40dB(A)	52dB(A)

Where noise from the proposed development is predicted to exceed the sleep disturbance trigger levels above, a more detailed noise level assessment is required. The detailed assessment is required to cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the frequency of events occurring during the nighttime.

6.1.4 Summary of Noise Emission Requirements

Taking the more stringent of the intrusiveness and amenity criteria, and also incorporating the sleep disturbance criteria, noise emission goals become as set out below.

Table 17: Summary of Noise Emission Requirements

Location	Noise Trigger Levels – dB(A)$L_{eq(15min)}$		
	Day (7am-6pm)	**Evening (6pm-10pm)**	**Night (10pm-7am)**
Residential	48dB(A)$L_{eq(15min)}$	47dB(A)$L_{eq(15min}$	43dB(A)$L_{eq(15min)}$ and 52dB(A)L_{Max}

6.2 Recommended noise control measures

As details of mechanical plant will be finalised at Detailed Design phase (post DA) phase, the following in-principal recommendations are provided:

6.2.1 Plant and Equipment

Noise from plant and equipment is assessed with reference to the EPA Noise Policy for Industry (criteria as outlined in Section 6.1.4.

The details of the mechanical plant and equipment servicing this development are yet to be finalised at this stage of the development. Therefore, the noise impacts from mechanical plant and equipment should be undertaken during the Detailed Design stage of the project.

However, we note:

- It is likely that primary plant and equipment items consist of car park/basement ventilation plant, stair pressure fans, lobby supply utilities spaces fans and air-conditioner condensers.
- Major fans located either in the basement or roof level such as car park ventilation (typically 75dB(A) at 3m), and utilities fans (typically 65dB(A) at 3m distance) are likely to require induct acoustic treatment between fan and external intake/discharge. This will consist of lined ducting or acoustic attenuators. The extent of treatment will depend on fan selection and position relative to the nearest apartment.
- Condenser units are proposed to be a combination of floor mounted units (located on each apartment level) that will serve multiple apartments along with some roof top units. The proposed locations of the floor mounted units on each floor are well shielded from apartments within the development and are set back from the site boundaries, however, may still require some acoustic treatment to each condenser space given the reverberant nature of the space between apartment buildings. There are no significant noise issues anticipated with the roof mounted units. Acoustic screening would easily provide the required attenuation for the units.

6.2.2 Loading Dock

Loading docks create a risk of structure borne noise transmission to apartments above, in particular use of pallet jacks and stock trolleys that have nylon wheels or similar. This is particularly a risk at sites where a supermarket is proposed, given their will be a high volume of pallet jack use, and often late at night.

There is no supermarket retail proposed at the above site. As such, loading dock usage would be relatively low and unlikely to be necessary between 10pm and 7am.

The loading dock is located well within the building at Ground Level and does not incorporate a turntable. The loading dock can accommodate HRV sized vehicle.

Given the location of the loading dock and provided that loading dock use does not occur between 10pm and 7am, there should be no further acoustic treatment required to the loading dock.

6.2.3 Noise from Pool and common areas (Level 8 and rooftop)

The primary impact of the communal open space on Level 8 will be to future residents within the development itself. Noise also has the potential to impact existing and future residential receivers surrounding the site.

A 1.8m balustrade is proposed around the pool area. The balustrade is to be glazed or a combination of masonry and glazing. The balustrade should be installed without gaps between the panelling to also act as a noise barrier.

Typically, use of communal open space will be regulated by building management and strata by-laws to protect residents of that development. Typical building management requirements are:

- Setting limits on times of use of the outdoor communal spaces and amenities to day light hours (typically 7am-sunset).
- Prohibiting parties and use of amplified music.
- Prohibiting anti-social behaviour (shouting etc).
- Developing a management plan for the common outdoor areas that considers potential noise impacts on apartments and neighbouring receivers

6.3 Recommended noise control measures

As details of mechanical plant will be finalised at Detailed Design phase (post DA) phase, the following in-principal recommendations are provided:

6.3.1 Cafés/Restaurants

The primary noise generation associated with a café will be from use of outdoor dining areas. We assume that cafes will lodge CDC Applications for use of their tenancy. Uses will be managed in accordance with applicable standards.

6.4 Cumulative Impacts

The site is located within the CBD Planning and Urban Design Strategy 2036 zone and identified as B4 Mixed Use. This zone is consistent for the block bounded by Archer Street, Bertram Street, Albert Avenue and Johnson Street.

Therefore neighbouring premises may develop to a similar size and scale. This would in turn, increase traffic volumes and traffic noise along Archer and Bertram Streets, but would also have the potential to increase ambient noise levels in the vicinity of the site.

To address the potential for higher traffic noise levels surrounding the site over time, a worst case scenario of a doubling of the traffic volume on Archer and Bertram Streets has been considered. This would typically result in a 3dB increase in the traffic noise level impacting these facades. The glazing design presented in Table 5 accounts for the potential for traffic noise increases.

The NSW Noise Policy for Industry address background noise creep as a result of increased development. This assessment considers both intrusiveness criteria and amenity criteria when establishing noise emission criteria for the site, accounting for the potential of background noise creep over time.

7 Internal sound insulation

As a minimum requirement, walls and floors and separation of services shall comply with the National Construction Code - Building Code of Australia 2022 (BCA).

The development is mixed use, with the residences being Class 2, residential.

7.1 NCC BCA 2022 - Class 2

The National Construction Code Series (NCC) 2022 - Volume 1, Building Code of Australia sets out the following acoustic provisions for Class 2 buildings:

F7D3 Determination of airborne sound insulation ratings

A form of construction required to have an airborne sound insulation rating must –

a. have the required value for weighted sound reduction index (Rw) or weighted sound reduction index with spectrum adaptation term (Rw + Ctr) determined in accordance with AS/NZS 1276.1 or ISO 717.1 using results from laboratory measurements; or

b. comply with Specification 28.

F7D4 Determination of impact sound insulation ratings

1) A floor in a building required to have an impact sound insulation rating must –

a) have the required value for weighted normalised impact sound pressure level (Ln,w) determined in accordance with AS/ISO 717.2 using results from laboratory measurements; or

b) comply with Specification 28

2) A wall in a building required to have an impact sound insulation rating must –

a) for a Class 2 or 3 building be of discontinuous construction;

3) For the purposes of this part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and

a) for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and

b) for other than masonry, there is no mechanical linkage between leaves except at the periphery.

F7D5 Sound insulation rating of floors

1) A floor in a Class 2 or 3 building must have an Rw + Ctr (airborne) not less than 50 and an Ln,w (impact) not more than 62 if it separates –

a) sole-occupancy units; or

b) a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.

F7D6 Sound insulation rating of walls

1) A wall in a Class 2 or 3 building must –

a) have an Rw + Ctr (airborne) not less than 50, if it separates sole-occupancy units; and

b) have an Rw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and

c) comply with F7D4(2) if it separates:

(i) a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or

(ii) a sole-occupancy unit from a plant room or lift shaft.

2) A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an Rw not less than 30.

5) Where a wall required to have sound insulation has a floor above, the wall must continue to –

a) the underside of the floor above; or

b) a ceiling that provides the sound insulation required for the wall.

F7D7 Sound insulation rating of internal services

1) If a duct or soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an Rw+Ctr (airborne) not less than –

a) 40 if the adjacent room is a habitable room (other than a kitchen); or

b) 25 if the adjacent room is a kitchen or non-habitable room.

2)If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (1)(a) and (b).

F7D8 Sound isolation of pumps

A flexible coupling must be used at the point of connection between the service pipes in a building and any circulating or other pump.

8 Construction Noise and Vibration Assessment

A detailed Demolition, Excavation and Construction Management Plan is to be prepared for the site prior to the issue of Construction Certificate detailing the site-specific plant and equipment to be used, expected periods of construction, and noise and vibration management treatments and procedures to be implemented.

8.1 Environmental Protection Authority's Construction Noise Guidelines

The Environmental Protection Authority (EPA) released its Interim Construction Noise Guideline (ICNG) in 2009. This document is being referred to as EPA's standard policy for assessing construction noise on new projects.

The key components of the ICNG that can be incorporated into this assessment include:

1. Use of LAeq as the descriptor for measuring and assessing construction noise.

In recent years NSW noise policies including EPA's NSW Industrial Noise Policy (INP) and the NSW Environmental Criteria for Road Traffic Noise (ECRTN) have moved to the primary use of L_{Aeq} over any other descriptor. As an energy average, L_{Aeq} provides ease of use when measuring or calculating noise levels since a full statistical analysis is not required as when using, for example, the L_{A10} descriptor.

Consistent with the latest guideline (ICNG) the use of L_{Aeq} as the key descriptor for measuring and assessing construction noise may follow a 'best practice' approach.

2. Application of feasible and reasonable noise mitigation measures

As stated in the ICNG, a noise mitigation measure is feasible if it is capable of being put into practice and is practical to build given the project constraints.

Selecting reasonable mitigation measures from those that are feasible involves making a judgement to determine whether the overall noise benefit outweighs the overall social, economic and environmental effects, including the cost of the measure.

3. Quantitative and qualitative assessment

The ICNG provides two methods for assessment of construction noise, being either a quantitative or a qualitative assessment.

A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement and prediction of noise levels, and assessment against set criteria.

A qualitative assessment is recommended for small projects with a short-term duration where works are not likely to affect an individual or sensitive land use for more than three weeks in total. It focuses on

minimising noise disturbance through the implementation of feasible and reasonable work practices, and community notification.

Given the significant scale of the construction works proposed for this Project, a quantitative assessment is carried out herein, consistent with the ICNG's requirements.

4. Management Levels

Residences

Table 10 below (reproduced from Table 2 of the ICNG) sets out the noise management levels and how they are to be applied. The guideline intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

The rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 10: Noise at residences using quantitative assessment

Time of Day	Management Level $L_{Aeq\ (15\ min)}$*	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5dB(A)	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Sensitive Land Use

Table 11 below (reproduced from Table 2 of the ICNG) sets out the noise management levels for various sensitive land use developments.

Table 11: Noise at other sensitive land uses using quantitative assessment

Land use	Management level, $L_{Aeq\ (15\ min)}$ – applies when land use is being utilised
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Hospital wards and operating theatres	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas	External noise level 65 dB(A)
Passive recreation areas	External noise level 60 dB(A)
Community centres	Depends on the intended use of the centre. Refer to the 'maximum' internal levels in AS2107 for specific uses.

8.2 Criteria at established receivers

Table 12 presents the construction noise management levels established for the nearest noise sensitive residential receivers based on the noise monitoring undertaken in the vicinity of the site. Based on distances to receivers, the likely most impacted receivers will be the existing residents immediately surrounding the proposed development site. The table below is not an exhaustive assessment of residents in the area but establishes the likely noise impacts and requirements for amelioration treatment during construction. A full assessment will be undertaken at the Construction Certificate stage of the project.

Table 12: Construction noise management levels at residential receivers, dB(A)

Address	Day L_{A90} rating background level (RBL)	Day noise management level $L_{Aeq(15min)}$
Residential apartments to the north of the site	43	53
Single dwelling south of the site	43	53
Residential apartments to the west of the site	43	53
Single dwellings to the east of the site	43	53

8.2.1 Construction hours

The proposed construction works are expected to be undertaken during standard construction hours, as follows:

Mondays to Fridays:	7:00am to 6:00pm
Saturdays:	8:00am to 1:00pm
Sundays & Public Holidays:	No work performed

8.3 Construction noise assessment

A preliminary construction noise assessment has been undertaken with the highest expected sound power levels for plant and equipment typically used for excavation and construction.

Noise levels at any receiver locations resulting from construction works would depend on the location of the receiver with respect to the area of construction, shielding from intervening topography and structures, and the type and duration of construction being undertaken. Furthermore, noise levels at receivers would vary significantly over the total construction program due to the transient nature and large range of plant and equipment that could be used.

Table 13 presents noise levels likely to be experienced at the nearby affected receivers based on the construction activities, and plant and equipment associated with the proposed development, where the range represents the noise levels from the plant item being at a location furthest away and at a location closest to each receiver location. Noise levels were calculated taking into consideration attenuation due to distance between the construction works and the receiver locations and any intervening structures.

Table 13: Predicted $L_{Aeq(15min)}$ noise levels for typical construction plant, dB(A) – no treatment

Plant item	Plant description	Predicted $L_{eq(15min)}$ construction noise levels at receiver location (external)			
		Residential apartments to the north of the site	Single dwelling south of the site	Residential apartments to the west of the site	Single dwellings to the east of the site
Noise Management Level		*53*	*53*	*53*	*53*
Demolition					
1.	Concrete saw	71-93	69-84	70-80	69-80
2.	Excavator mounted hydraulic breaker	71-93	69-84	70-80	69-80
Excavation					
3.	Rock breaker	71-93	69-84	70-80	69-80
4.	Rock saw	71-93	69-84	70-80	69-80
5.	40 tonne excavator with saw and hammer	71-93	69-84	70-80	69-80
Construction					
6.	Mobile crane	66-88	64-79	65-75	64-75
7.	Powered hand tools	66-88	64-79	65-75	64-75
8.	Grinder	65-87	63-78	64-74	63-74

Plant item	Plant description	Predicted $L_{eq(15min)}$ construction noise levels at receiver location (external)			
		Residential apartments to the north of the site	Single dwelling south of the site	Residential apartments to the west of the site	Single dwellings to the east of the site
9.	Truck – cement mixer	64-86	62-77	63-73	62-73

Based on the predicted construction noise levels presented in the table above, the construction management levels will generally be exceeded when works are conducted at the closest proximity to the nominated receiver locations.

Furthermore, construction noise levels at all receivers are predicted to be greater than the highly noise affected level of 75dB(A) for the operation of the noisiest individual construction plant and equipment in close proximity.

In light of the predicted noise levels above, it is recommended that a feasible and reasonable approach towards noise management measures be applied to reduce noise levels as much as possible to manage the impact from construction noise.

Further details on construction noise mitigation and management measures are provided below.

8.4 General Construction Noise Control Methods

Implementation of noise control measures, such as those suggested in the Interim Construction Noise Guideline (ICNG) and Australian Standard 2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites", are expected to reduce predicted construction noise levels. Reference to Australian Standard 2436-1981, Appendix E, Table E1 suggests possible remedies and alternatives to reduce noise emission levels from typical construction equipment. Table E2 in Appendix E presents typical examples of noise reductions achievable after treatment of various noise sources. Table E3 in Appendix E presents the relative effectiveness of various forms of noise control treatment.

Table 14: Relative Effectiveness of Various Forms of Noise Control, dB(A) below presents noise control methods, practical examples and expected noise reductions according to AS2436 and according to Renzo Tonin & Associates' opinion based on experience with past projects.

Table 14: Relative Effectiveness of Various Forms of Noise Control, dB(A)

Noise Control Method	Practical Examples	Typical noise reduction possible in practice		Maximum noise reduction possible in practice	
		AS 2436	Renzo Tonin & Assoc.	AS 2436	Renzo Tonin & Assoc.
Screening	Acoustic barriers such as earth mounds, temporary or permanent noise barriers	7 to 10	5 to 10	15	15
Acoustic Enclosures	Engine casing lagged with acoustic insulation and plywood	15 to 30	10 to 20	50	30
Engine Silencing	Residential class mufflers	5 to 10	5 to 10	20	20

Noise Control Method	Practical Examples	Typical noise reduction possible in practice		Maximum noise reduction possible in practice	
		AS 2436	Renzo Tonin & Assoc.	AS 2436	Renzo Tonin & Assoc.
Substitution by alternative process	Use electric motors in preference to diesel or petrol	15 to 25	15 to 25	60	40

The Renzo Tonin & Associates' listed noise reductions are conservatively low and should be referred to in preference to those of AS2436, for this assessment.

Table 15: Noise Control Measures for Expected Construction Plant below identifies possible noise control measures which are applicable on the construction plant likely to be used on site.

Table 15: Noise Control Measures for Expected Construction Plant

Plant Description	Screening	Acoustic Enclosures	Silencing	Alternative Process
Concrete Saw	✔	✔	x	x
Jack hammers	✔	x	✔	x
Mobile Crane	✔	✔	✔	x
Front End Loader	✔	x	✔	x
Pneumatic Hand Tools (general)	✔	✔	✔	✔
Bulldozer	✔	x	✔	x
Tracked Excavator	✔	x	✔	x
Concrete Trucks	✔	x	✔	x
Delivery Trucks	✔	x	✔	x
Dump Trucks	✔	x	✔	x
Truck (> 20 tonne)	✔	x	✔	x
Welders	✔	✔	x	x
Cherry Picker	✔	x	✔	x
Concrete Pump	✔	✔	✔	✔
Power Generator	✔	✔	✔	x
Light commercial vehicles	✔	x	✔	x
Silenced Air Compressor	✔	✔	✔	✔

To ensure efficient noise attenuation performance is achieved using any of the methods listed above, it is recommended acoustic engineers work closely with the construction contractors and carry out preliminary testing prior to commencement of works.

In addition to physical noise controls, the following general noise management measures should be followed:

- Plant and equipment should be properly maintained
- Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended

- Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel
- As much as possible, non-percussive demolition equipment (dozer with bucket,/saw of rock ripper) should be used in place of percussive equipment (dozer with hydraulic hammer).
- Use of electric cranes (as opposed to diesel) and bored piling (as opposed to vibrated) whenever feasible.
- Avoid any unnecessary noise when carrying out manual operations and when operating plant
- Any equipment not in use for extended periods during construction work should be switched off
- Plant used intermittently to be throttled down or shut down when not in use where practicable
- Notification to immediate surrounding residents (both single dwellings and apartment buildings) should be provided detailed estimated duration of demolition, excavation and construction.
- Noise compliance monitoring for all major equipment and activities on site should be undertaken prior to their commencement of work on site.
- In addition to the noise mitigation measures outlined above, a management procedure would need to be put in place to deal with noise complaints that may arise from construction activities. Each complaint would need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits. The person selected to liaise with the community must be adequately trained and experienced in such matters. **Complaints** - Owners and occupants of nearby affected properties are to be informed by direct mail of a direct telephone line and contact person where any noise and/or vibration complaints are to be reported.
- Good relations with people living and working in the vicinity of a construction site should be established at the beginning of a project and be maintained throughout the project, as this is of paramount importance. Keeping people informed of progress and taking complaints seriously and dealing with them expeditiously is critical. The person selected to liaise with the community should be adequately trained and experienced in such matters.

8.5 Vibration criteria

Construction vibration is associated with three main types of impact:

- disturbance to building occupants;
- potential damage to buildings; and
- potential damage to sensitive equipment in a building.

Generally, if disturbance to building occupants is controlled, there is limited potential for structural damage to buildings.

Vibration amplitude may be measured as displacement, velocity, or acceleration.

- Displacement (x) measurement is the distance or amplitude displaced from a resting position. The SI unit for distance is the meter (m), although common industrial standards include mm.
- Velocity ($v=\Delta x/\Delta t$) is the rate of change of displacement with respect to change in time. The SI unit for velocity is meters per second (m/s), although common industrial standards include mm/s. The Peak Particle Velocity (PPV) is the greatest instantaneous particle velocity during a given time interval. If measurements are made in 3-axis (x, y, and z) then the resultant PPV is the vector sum (i.e. the square root of the summed squares of the maximum velocities) regardless of when in the time history those occur.
- Acceleration ($a=\Delta v/\Delta t$) is the rate of change of velocity with respect to change in time. The SI unit for acceleration is meters per second squared (m/s2). Construction vibration goals are summarised below.

Construction vibration goals are summarised below.

8.5.1 Disturbance to buildings occupants

Assessment of potential disturbance from vibration on human occupants of buildings is made in accordance with the DECC '*Assessing Vibration; a technical guideline*' (DECC, 2006). The guideline provides criteria which are based on the British Standard BS 6472-1992 '*Evaluation of human exposure to vibration in buildings (1-80Hz)*'. Sources of vibration are defined as either 'Continuous', 'Impulsive' or 'Intermittent'. Table 16 provides definitions and examples of each type of vibration.

Table 16: Types of vibration

Type of vibration	Definition	Examples
Continuous vibration	Continues uninterrupted for a defined period (usually throughout the day-time and/or night-time)	Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).
Impulsive vibration	A rapid build-up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). It can also consist of a sudden application of several cycles at approximately the same amplitude, providing that the duration is short, typically less than 2 seconds	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent vibration	Can be defined as interrupted periods of continuous or repeated periods of impulsive vibration that varies significantly in magnitude	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer, this would be assessed against impulsive vibration criteria.

Type of vibration	Definition	Examples

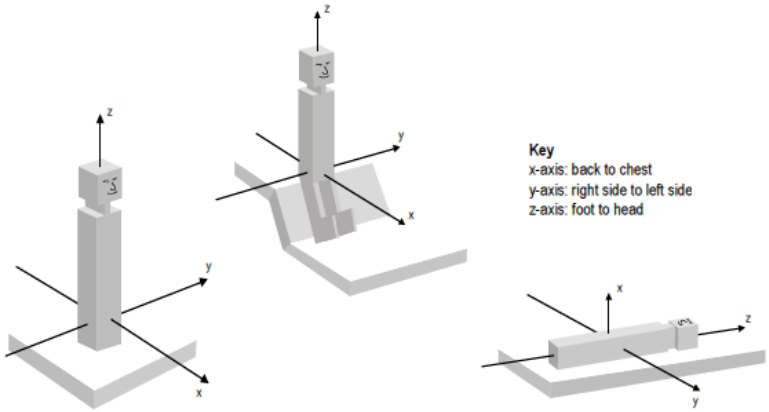
Source: Assessing Vibration; a technical guideline, Department of Environment & Climate Change, 2006

The vibration criteria are defined as a single weighted root mean square (rms) acceleration source level in each orthogonal axis. Section 2.3 of the guideline states:

> *'Evidence from research suggests that there are summation effects for vibrations at different frequencies. Therefore, for evaluation of vibration in relation to annoyance and comfort, overall weighted rms acceleration values of the vibration in each orthogonal axis are preferred (BS 6472).'*

When applying the criteria, it is important to note that the three directional axes are referenced to the human body, i.e. x-axis (back to chest), y-axis (right side to left side) or z-axis (foot to head). Vibration may enter the body along different orthogonal axes and affect it in different ways. Therefore, application of the criteria requires consideration of the position of the people being assessed, as illustrated in Figure 2. For example, vibration measured in the horizontal plane is compared with x- and y-axis criteria if the concern is for people in an upright position, or with the y- and z- axis criteria if the concern is for people in the lateral position.

Figure 2 – Orthogonal axes for human exposure to vibration



The preferred and maximum values for continuous and impulsive vibration are defined in Table 2.2 of the guideline and the relevant values are reproduced in Table 17.

Table 17: Preferred and maximum levels for human comfort

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Continuous vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day- or night-time	0.020	0.014	0.040	0.028
Impulsive vibration (weighted RMS acceleration, m/s^2, 1-80Hz)					
Residences	Daytime	0.30	0.21	0.60	0.42

Location	Assessment period[1]	Preferred values		Maximum values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Day- or night-time	0.64	0.46	1.28	0.92

Notes: 4. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am

The acceptable vibration dose values (VDV) for intermittent vibration are defined in Table 2.4 of the guideline and are reproduced in Table 18

Table 18: Acceptable vibration dose values for intermittent vibration (m/s$^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80

Notes: 5. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am

8.5.2 Building damage

Potential structural damage of buildings as a result of vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as British Standard 7385 Part 2 and German Standard DIN4150-3. Currently there is no existing Australian Standard for assessment of structural building damage caused by vibration energy.

Within British Standard 7385 Part 1: 1990, different levels of structural damage are defined:

- *Cosmetic - The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition the formation of hairline cracks in mortar joints of brick/concrete block construction.*
- *Minor - The formation of large cracks or loosening of plaster or drywall surfaces, or cracks through bricks/concrete blocks.*
- *Major - Damage to structural elements of the building, cracks in supporting columns, loosening of joints, splaying of masonry cracks, etc.*

The vibration limits in Table 1 of British Standard 7385 Part 2 (1993) are for the protection against cosmetic damage, however guidance on limits for minor and major damage is provided in Section 7.4.2 of the Standard:

"7.4.2 Guide values for transient vibration relating to cosmetic damage

Limits for transient vibration, above which cosmetic damage could occur are given numerically in Table 1 and graphically in Figure 1. In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to line 2

are reduced. Below a frequency of 4 Hz, where a high displacement is associated with a relatively low peak component particle velocity value a maximum displacement of 0.6 mm (zero to peak) should be used.

Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1, and major damage to a building structure may occur at values greater than four times the tabulated values."

Within DIN4150-3, damage is defined as "*any permanent effect of vibration that reduces the serviceability of a structure or one of its components*" (p.2). The Standard also outlines:

"that for structures as in lines 2 and 3 of Table 1, the serviceability is considered to have been reduced if

cracks form in plastered surfaces of walls;

existing cracks in the building are enlarged;

partitions become detached from loadbearing walls or floors.

These effects are deemed 'minor damage. " (DIN4150.3, 1990, p.3)"

While the DIN Standard defines the above damage as 'minor', based on the definitions provided in BS7385, the DIN standard is considered to deal with cosmetic issues rather than major structural failures.

British Standard

British Standard 7385: Part 2 '*Evaluation and measurement of vibration in buildings*', can be used as a guide to assess the likelihood of building damage from ground vibration. BS7385 suggests levels at which 'cosmetic', 'minor' and 'major' categories of damage might occur.

The cosmetic damage levels set by BS 7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for certain particular building types. Damage comprises minor non-structural effects such as hairline cracks on drywall surfaces, hairline cracks in mortar joints and cement render, enlargement of existing cracks and separation of partitions or intermediate walls from load bearing walls. 'Minor' damage is considered possible at vibration magnitudes which are twice those given and 'major' damage to a building structure may occur at levels greater than four times those values.

BS7385 is based on peak particle velocity and specifies damage criteria for frequencies within the range 4Hz to 250Hz, being the range usually encountered in buildings. At frequencies below 4Hz, a maximum displacement value is recommended. The values set in the Standard relate to transient vibrations and to low-rise buildings. Continuous vibration can give rise to dynamic magnifications due to resonances and may need to be reduced by up to 50%.Table 19 sets out the BS7385 criteria for cosmetic, minor and major damage.

Table 19: BS 7385 structural damage criteria

Group	Type of structure	Damage level	Peak component particle velocity1, mm/s		
			4Hz to 15Hz	15Hz to 40Hz	40Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	Cosmetic	50		
		Minor2	100		
		Major2	200		
2	Un-reinforced or light framed structures Residential or light commercial type buildings	Cosmetic	15 to 20	20 to 50	50
		Minor2	30 to 40	40 to 100	100
		Major*2	60 to 80	80 to 200	200

Notes: 6. Peak Component Particle Velocity is the maximum Peak particle velocity in any one direction (x, y, z) as measured by a tri-axial vibration transducer.

7. Minor and major damage criteria established based on British Standard 7385 Part 2 (1993) Section 7.4.2

German Standard

German Standard DIN 4150 - Part 3 '*Structural vibration in buildings - Effects on Structure*' (DIN 4150-3), also provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are generally recognised to be conservative.

DIN 4150-3 presents the recommended maximum limits over a range of frequencies (Hz), measured in any direction, and at the foundation or in the plane of the uppermost floor of a building or structure. The vibration limits increase as the frequency content of the vibration increases. The criteria applicable to the nearest receivers are presented in Table 20.

Table 20: DIN 4150-3 structural damage criteria

Group	Type of structure	Vibration velocity, mm/s			
		At foundation at frequency of			Plane of floor uppermost storey
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15

8.6 Recommended minimum buffer distances

The pattern of vibration radiation is very different to the pattern of airborne noise radiation, and is very site specific as final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver. Accordingly, based on a database containing vibration measurements from past projects and library information, Table 21 below presents the recommended minimum working distances for high vibration generating plant.

Table 21: Recommended minimum working distances for vibration intensive plant, m

Plant item	Rating / description	Minimum working distance	
		Cosmetic damage	Human response
Excavator[1]	<=30 Tonne (travelling/ digging)	10	15
Small hydraulic hammer[2]	300kg (5-12 tonne excavator)	2	7
Medium hydraulic hammer[2]	900kg (12-18 tonne excavator)	7	23
Large hydraulic hammer[2]	1600kg (18-34 tonne excavator)	22	73
Pile boring[2]	≤ 800 mm	2 (nominal)	N/A
Pneumatic jack hammer	Hand held	1	Avoid contact with structure
Truck movements[2]	Dump trucks, watercarts, tippers	-	10 m

Notes: 8. TCA Construction Noise Strategy (Rail Projects) November 2011
9. Renzo Tonin & Associates project files, databases & library

Site specific buffer distances should be determined once vibration emission levels are measured from each plant item prior to the commencement of their regular use on site. Where construction activity occurs in close proximity to sensitive receivers, minimum buffer distances for building damage should be determined by site measurements and maintained.

8.6.1 Damage to buried services

Section 5.3 of DIN 4150-3:2016 also sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values, which apply at the wall of the pipe, are reproduced, and presented in Table 5 7 below.

Table 24: DIN 4150-3:1999 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline values for vibration velocity measured on the pipe, mm/s
1	Steel (including welded pipes)	100
2	Vitrified clay, concrete, reinforced concrete, prestressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

For long-term vibration the guideline levels presented in Table should be halved.

Recommended vibration goals for electrical cables and telecommunication services such as fibre optic cables range from between 50 mm/s and 100 mm/s. It is noted however that although the cables may sustain these vibration levels, the services they are connected to, such as transformers and switch blocks, may not. It is recommended that should such equipment be encountered during the construction process an individual vibration assessment should be carried out. This may include a specific vibration impact statement addressing impact on the utility and consultation with the utility provider to confirm specific vibration requirements.

It is likely that reasonable and feasible vibration mitigation will be required. This would typically be addressed in a Construction Noise and Vibration Management Plan, prepared at CC stage. Indicative management measures are detailed below.

8.6.2 Vibration assessment

8.6.2.1 Minimum working distances

The recommended minimum working distances for vibration intensive plant are presented below

Table 27: Recommended minimum working distances for vibration intensive equipment

Plant item	Minimum working distance, m					
	Cosmetic damage			Human disturbance		
	Commercial and industrial buildings1	Dwellings and similar structures1	Sensitive structures (e.g., heritage)1	Residences Day2	Offices	Workshops
Excavator w/Hydraulic Breaker, Vibratory Compactor	5	5	10	20	15	10

Notes: 1. Vibration limits referenced from DIN 4150 Structural Damage - Safe Limits for Short-term Building Vibration.
2. Daytime is 7 am to 10 pm;

Site specific buffer distances for vibration significant plant items must be measured on site where plant and equipment is likely to operate close to or within the minimum working distances for cosmetic damage.

The predicted vibration levels indicate:

Based on the location of neighbouring premises surrounding the site along with the excavation required for the construction of the proposed development, vibration monitoring may be required during the excavation and construction period. Human disturbance is also likely to impact the closest residential receivers.

8.6.2.2 Vibration mitigation measures

The following vibration management measures are provided to minimise vibration impact from construction activities to the nearest affected receivers and to meet the relevant human comfort and building damage vibration limits:

- Dilapidation surveys should be conducted at residents to the north and south of the site. This will inform if any of the adjacent residential development should be subject to vibration criteria different to those identified in section 8.2.2.2

- Where excavation in rock activity occurs within 15m of residential receivers, vibration monitoring is recommended during initial rock excavation to determine if vibration levels are such that they may cause building damage or excessive annoyance to occupants of the building.

- Where vibration is found to be excessive, management measures should be implemented to ensure vibration compliance is achieved. Management measures may include modification of construction methods such as using smaller equipment, establishment of safe buffer zones as mentioned above, and if necessary, time restrictions for the most excessive vibration activities.

- Notification by letterbox drop would be carried out for all occupied buildings within 50m of the construction site. These measures are to address potential community concerns that perceived vibration may cause damage to property.

- A management procedure should be implemented to deal with vibration complaints. Each complaint should be investigated and where vibration levels are established as exceeding the set limits, appropriate amelioration measures should be put in place to mitigate future occurrences.

8.6.3 Cumulative Impacts

The cumulative impacts of concurrent construction in terms of noise and vibration are to be considered when considering suitable noise and vibration mitigation measured.

- *Likely future development* include (but not limited to):

- 57-61 Archer Street & 34 Albert Avenue, Chatswood
- SSD-72891212
- Mixed-use, shop top housing development with the provision of affordable housing.

- 51-55 Archer Street, Chatswood
- SSD-75116211
- Construction of a 35-storey mixed use shop top housing development including in-fill affordable housing, comprising a two-storey non-residential podium, a 33-storey residential tower and a multi-level basement carpark.

- 31-33 Archer Street, Chatswood
- DA-2025/17
- Demolition of existing structures and construction of shop top housing buildings consisting of part 14 storeys and part 5 storey.

8.6.3.1 Mitigation measures

In order to manage the cumulative impacts of noise and vibration from construction, the following mitigation measured should be considered:

- Correspondence and coordination with developers of adjoining sites to offset high noise and vibration events (particularly excavation).
- Correspondence and coordination with developers of adjoining sites to offset truck and vehicle movements to and from the site
- Additional mitigation measures as recommended in Table 15 to account for cumulative construction noise impacts

9 Conclusion

Renzo Tonin & Associates has completed a Noise and Vibration Impact Assessment of the proposed mixed-use development with affordable in-fill housing at 37 Archer Street, Chatswood.

The assessment includes investigation of noise impacts onto the site from nearby roads and potential noise impacts from future mechanical plant servicing the development. The assessment has found that reasonable controls can be incorporated into the building design to comply with relevant standards (SEPP Transport and Infrastructure) for internal noise levels (to protect residents from road traffic noise).

Noise emission goals for the operation of mechanical plant and equipment have been set in accordance with the Noise Policy for Industry. A preliminary assessment has been undertaken and conclude it is feasible that noise emissions from the subject site can comply with these criteria, subject to detailed design for Construction Certificate.

An examination of noise and vibration from the construction phase of the development is presented in Section 7.

Cumulative impacts from the construction phase and the long term use of the development site have been considered and addressed in Sections 6 and 7 of this assessment.

In conclusion, the proposed site is capable of complying with all relevant acoustic criteria through means of standard acoustic treatment and management. All recommended mitigations in this report will be implemented as necessary through ongoing design development to ensure the applicable acoustic design requirements as satisfied.

Authored by:

Rebecca Corbett
Principal Engineer
B.E (Mech), MAAS
Rebecca.Corbett@renzotonin.com.au

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.

L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B Criteria and design methodology

B.1.1 Department of Planning publication 'Development near rail corridors and busy roads – Interim guideline'

To support the Infrastructure SEPP Transport and Infrastructure, the NSW Department of Planning released the *Development in Rail Corridors and Busy Roads – Interim Guideline* (December 2008) – the "Guideline". The Guideline assists in the planning, design and assessment of developments in, or adjacent to, major transport corridors in terms of noise, vibration and air quality. While the SEPP applies only to roads with an AADT greater than 40,000 vehicles, the guideline is also recommended for other road traffic noise affected sites.

B.1.2 Clarification of SEPP Trasnport and Infrastructure noise limits

The Guideline clarifies the time period of measurement and assessment. Section 3.4 '*What Noise and Vibration Concepts are Relevant*' and Table 3.1 of Section 3.6.1 confirms that noise assessment is based over the following time periods:

- Daytime 7:00am - 10:00pm $L_{Aeq(15hr)}$
- Night-time 10:00pm - 7:00am $L_{Aeq(9hr)}$

The noise criteria nominated in the SEPP apply to internal noise levels with windows and doors closed. However, as the preliminary noise assessment is based on measurements/predictions at external locations, equivalent external noise criteria has been established. The equivalent external noise criterion is used to determine which areas of the development may require acoustic treatment in order to meet the internal noise requirements of the SEPP. The equivalent external goals have been determined on the following basis:

- The Guideline states: "*If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia*." The internal criteria with windows open is therefore 10dB(A) above the criteria explicitly outlined in the SEPP.
- The generally accepted noise reduction through an open window from a free-field external position is 10dB(A). Windows/doors are assumed to be open no more than 5% of room floor area, in accordance with the Building Code of Australia (BCA) ventilation requirements.

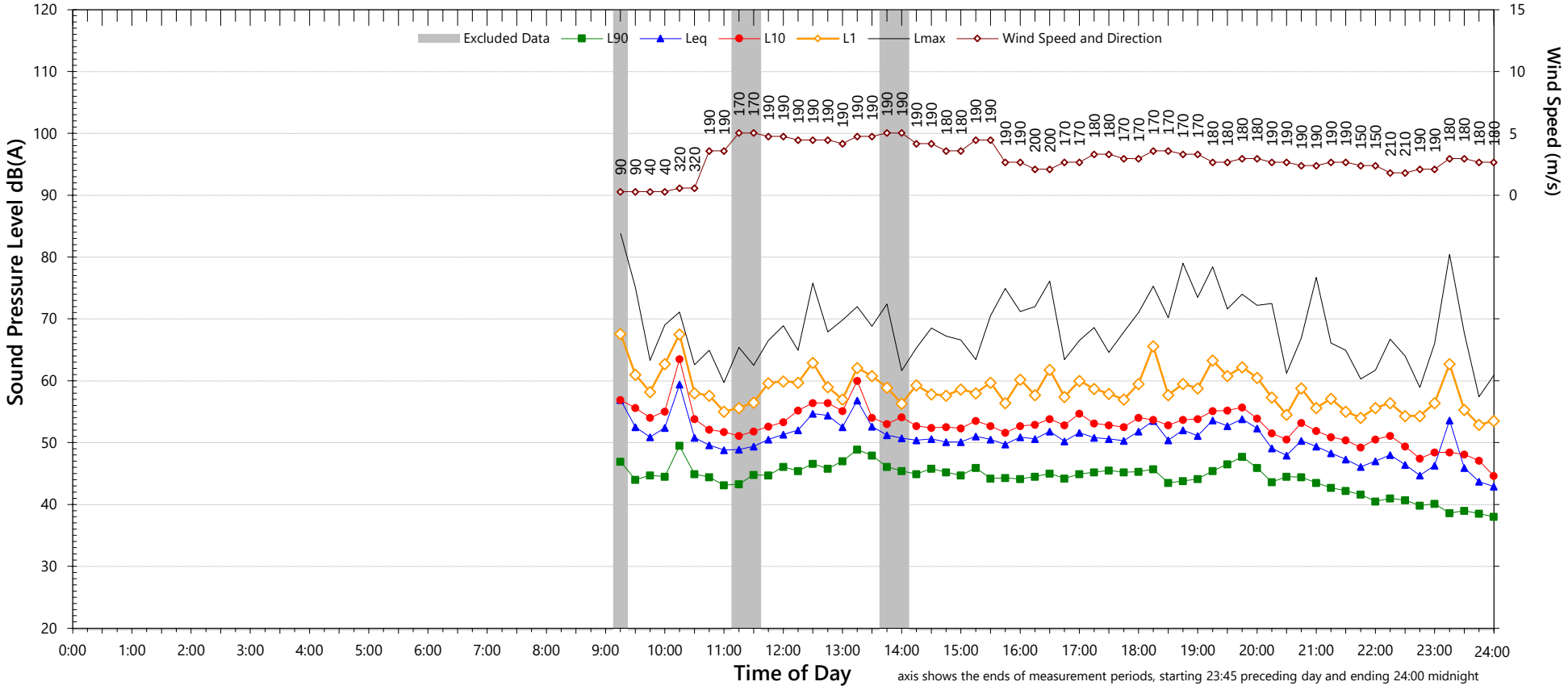
The SEPP internal noise criteria along with the equivalent external noise criteria for residential premises.

APPENDIX C Results of noise monitoring

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Wednesday, 5 February 2025



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		-	42	37
L_{Aeq}	#N/A	-	51	46

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	80
L_{AFMax} - L_{Aeq} (Range)	18	to	31

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	-	49
$L_{Aeq\ 1hr}$ upper 10 percentile	-	52
$L_{Aeq\ 1hr}$ lower 10 percentile	-	43

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

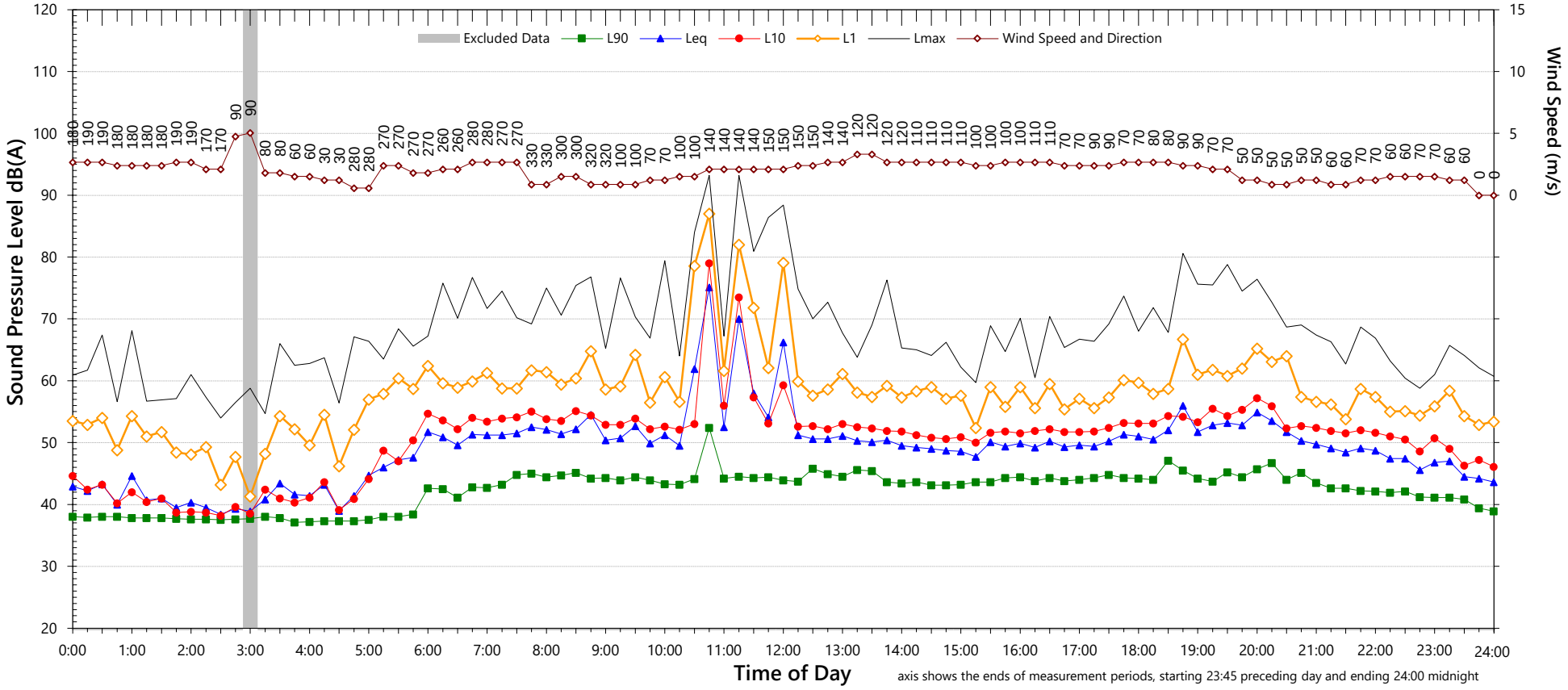
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Thursday, 6 February 2025



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		43	42	38
L_{Aeq}	#N/A	61	52	47

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	76
L_{AFMax} - L_{Aeq} (Range)	16	to	26

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	62	49
$L_{Aeq\ 1hr}$ upper 10 percentile	63	52
$L_{Aeq\ 1hr}$ lower 10 percentile	52	44

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

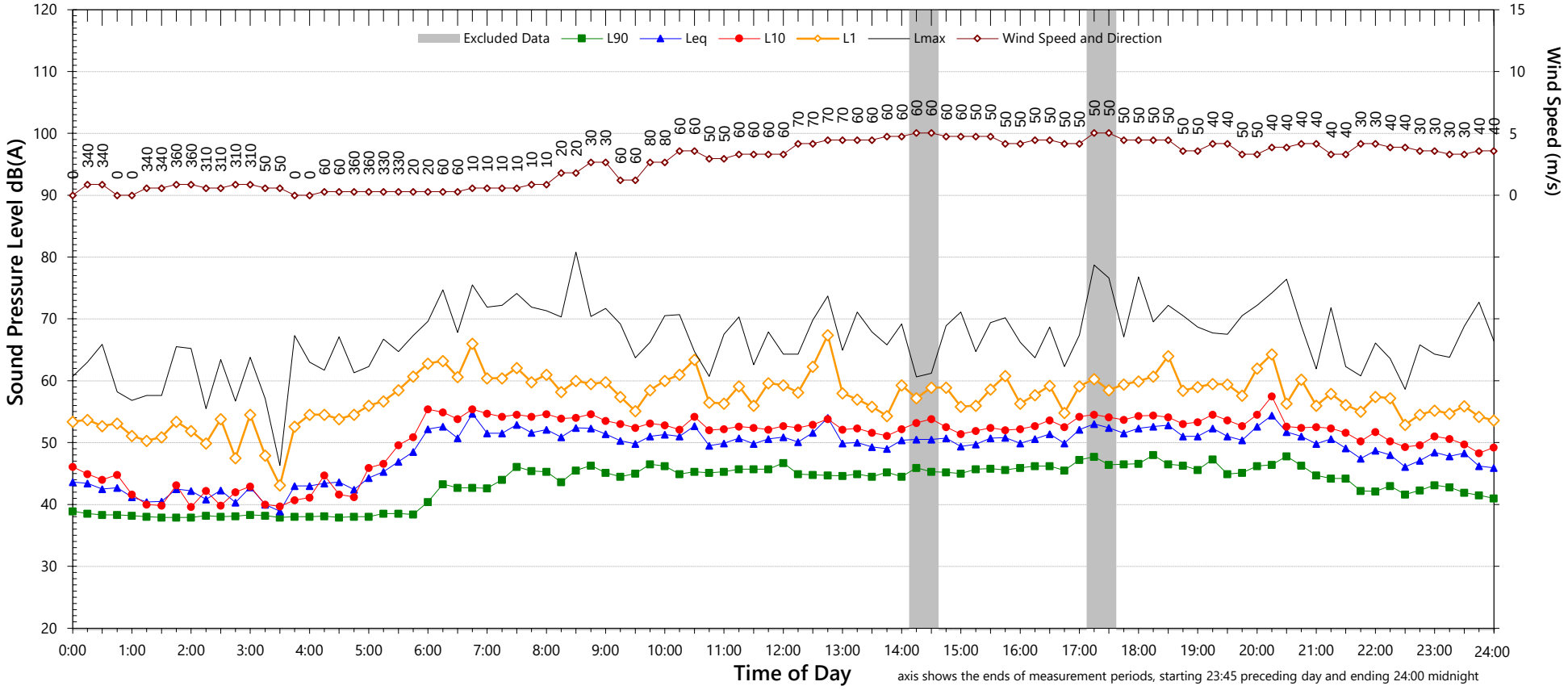
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Friday, 7 February 2025



NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		45	43	38
L_{Aeq}	#N/A	51	51	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	90
L_{AFMax} - L_{Aeq} (Range)	18	to	35

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	54	52
$L_{Aeq\ 1hr}$ upper 10 percentile	55	56
$L_{Aeq\ 1hr}$ lower 10 percentile	52	44

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

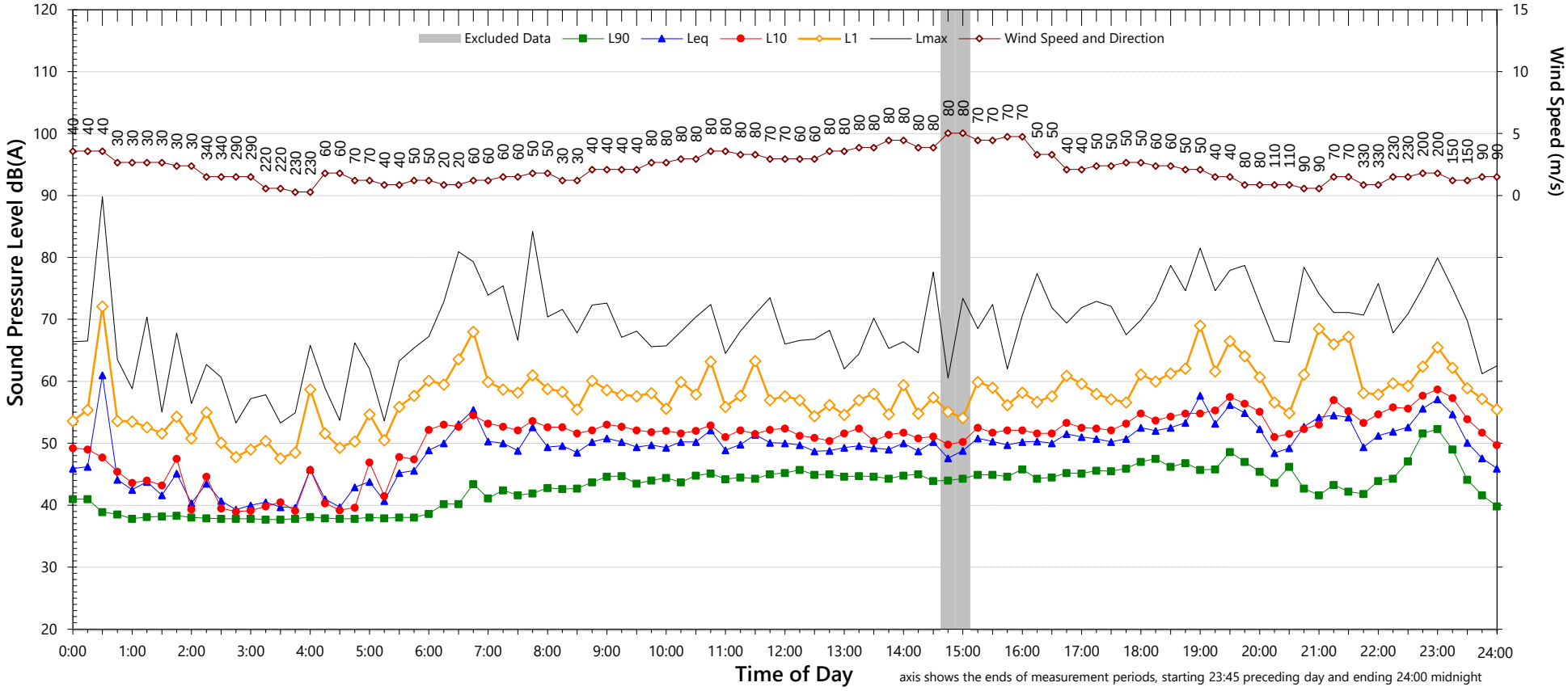
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Saturday, 8 February 2025



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		43	42	39
L_{Aeq}	#N/A	50	54	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	80
L_{AFMax} - L_{Aeq} (Range)	17	to	27

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	54	52
$L_{Aeq\ 1hr}$ upper 10 percentile	56	56
$L_{Aeq\ 1hr}$ lower 10 percentile	52	44

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

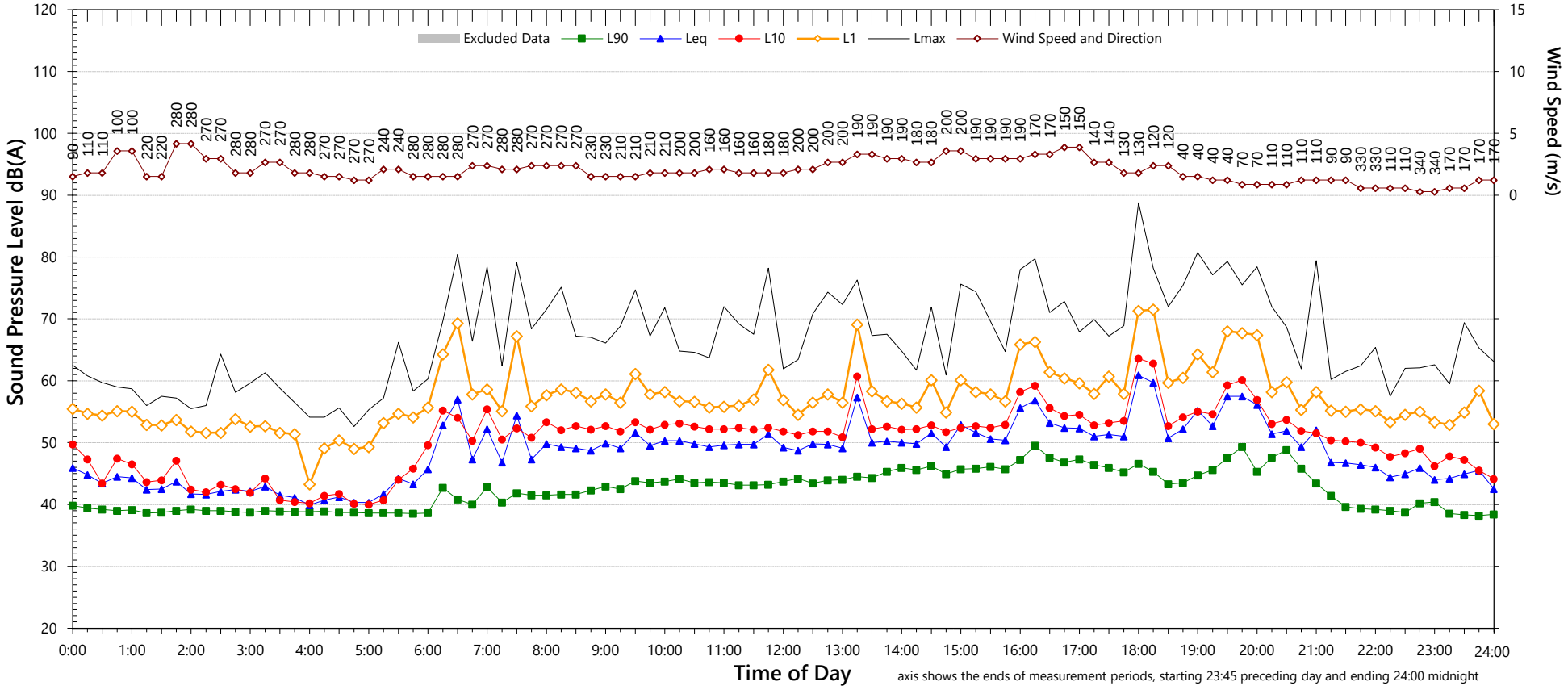
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Sunday, 9 February 2025



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 24:00 midnight

NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		43	39	38
L_{Aeq}	#N/A	52	54	46

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	65	to	75
L_{AFMax} - L_{Aeq} (Range)	18	to	25

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	55	48
$L_{Aeq\ 1hr}$ upper 10 percentile	58	50
$L_{Aeq\ 1hr}$ lower 10 percentile	52	43

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

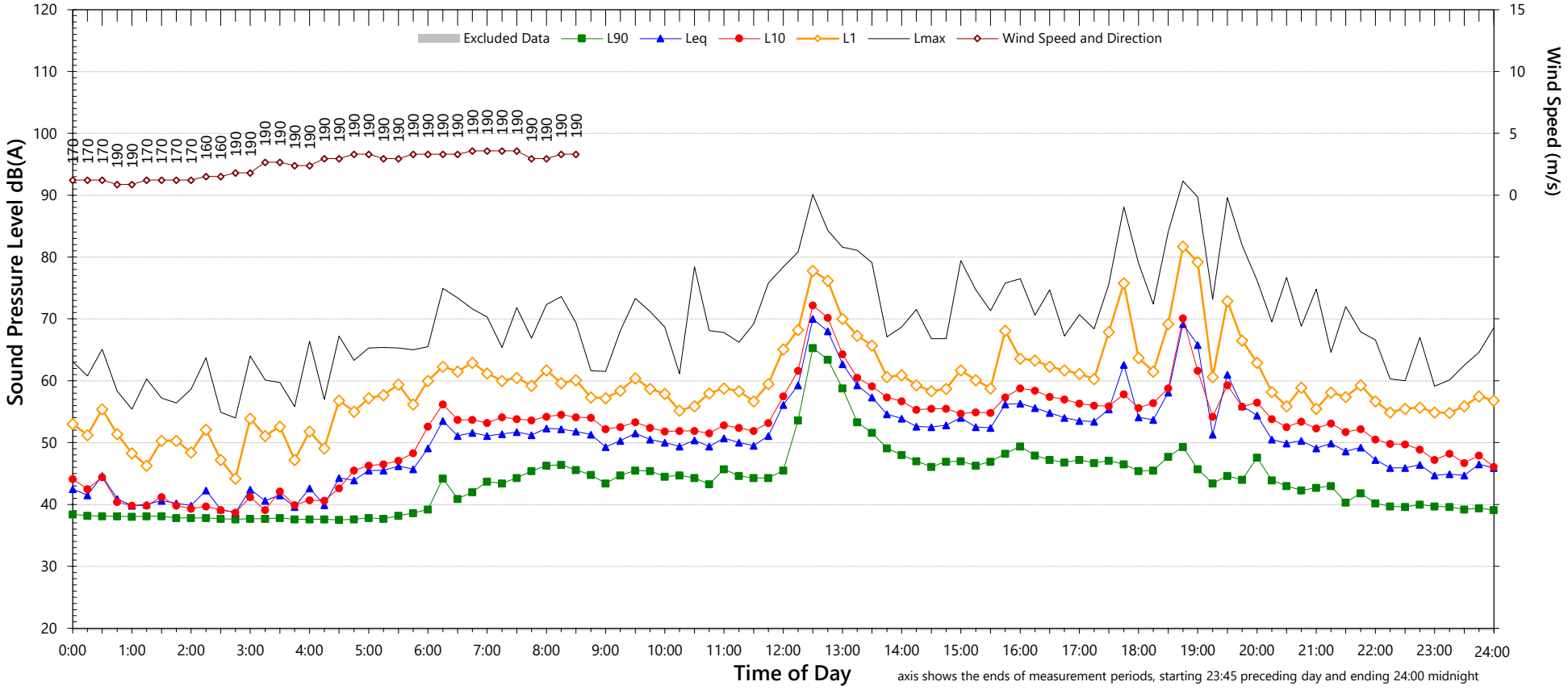
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Monday, 10 February 2025



NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		44	41	39
L_{Aeq}	#N/A	58	60	46

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	67	to	71
L_{AFMax} - L_{Aeq} (Range)	19	to	26

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	61	49
$L_{Aeq\ 1hr}$ upper 10 percentile	65	51
$L_{Aeq\ 1hr}$ lower 10 percentile	52	45

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

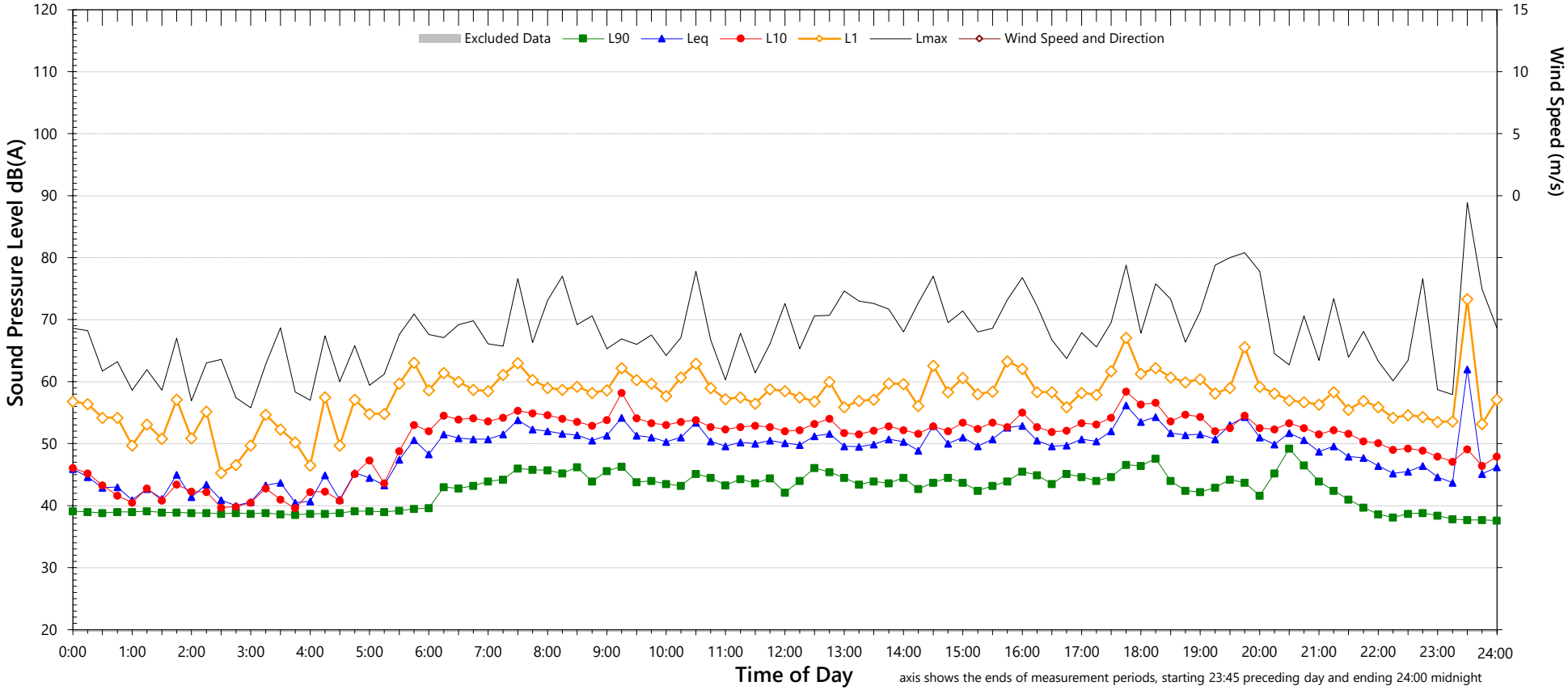
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Tuesday, 11 February 2025



NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		43	40	37
L_{Aeq}	#N/A	51	51	49

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	66	to	89
L_{AFMax} - L_{Aeq} (Range)	20	to	33

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	54	52
$L_{Aeq\ 1hr}$ upper 10 percentile	55	55
$L_{Aeq\ 1hr}$ lower 10 percentile	53	43

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

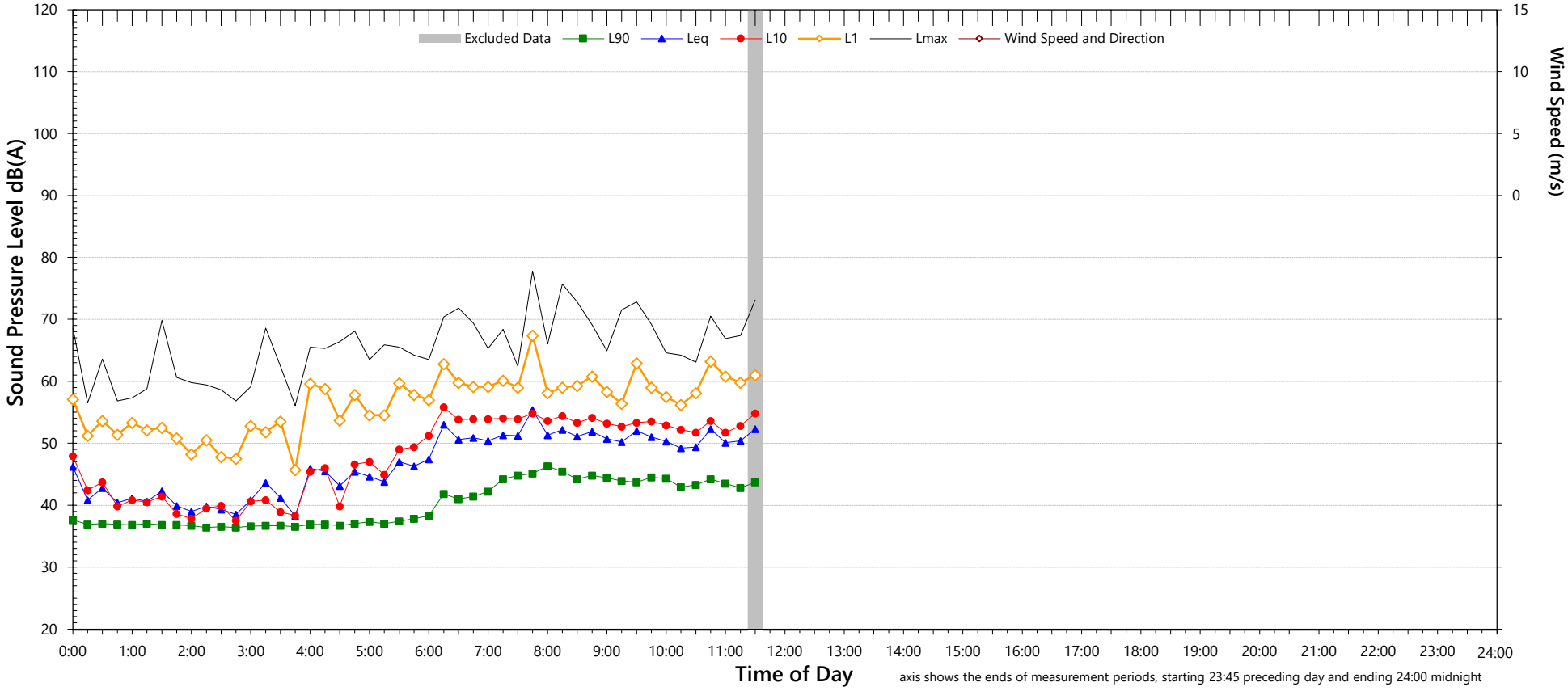
#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

Unattended Noise Monitoring Results

37 Archer street, Chatswood - Inside the Complex

Wednesday, 12 February 2025



NSW Noise Policy for Industry (Free Field)				
Descriptor		Day[2]	Evening[3]	Night[4 5]
L_{A90} ABL		-	-	-
L_{Aeq}	#N/A	-	-	-

Night Time Maximum Noise Levels			(see note 7)
L_{AFMax} (Range)	-	to	-
L_{AFMax} - L_{Aeq} (Range)	-	to	-

NSW Road Noise Policy (1m from facade)	#N/A	
Descriptor	Day	Night[5]
	7am-10pm	10pm-7am
$L_{Aeq\ 15\ hr}$ and $L_{Aeq\ 9\ hr}$	-	-
$L_{Aeq\ 1hr}$ upper 10 percentile	-	-
$L_{Aeq\ 1hr}$ lower 10 percentile	-	-

Notes:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.
2. "Day" is the period from 8am till 6pm on Sundays and 7am till 6pm on other days
3. "Evening" is the period from 6pm till 10pm
4. "Night" relates to the remaining periods
5. "Night" relates to period from 10pm on this graph to morning on the following graph.

#N/A

7. 1-hour values for L_{AFMax} are shown only where L_{AFMax} >65dB(A) and where L_{AFMax}- L_{Aeq} ≥15dB(A)

5 November 2025
E26577_HYECORP

EI Australia Pty Ltd
Suite 6.01, 55 Miller Street
PYRMONT, NSW, 2009

ABN 42 909 129 957

E service@eiaustralia.com.au
W www.eiaustralia.com.au
T 02 9516 0722

Updated Hydrogeological Report – E26577.E16.REV2 (Including Dewatering Management Plan and Groundwater Seepage Analysis)

EI Australia has issued an updated version of the Hydrogeological Report, including the Dewatering Management Plan and Groundwater Seepage Analysis, prepared for HYECORP.

The report E26577.E16.REV2 has been updated to confirm that Total Recoverable Hydrocarbons (TRH C10–C40) were tested using the silica gel clean-up method. Based on this method, petroleum hydrocarbons were detected in groundwater sampled at BH01.

Sections 3.4.7, 3.4.8, 5.3 and 5.5 have been revised to reflect these results and to indicate that treatment is required.

Please find attached the latest revision of the report for your reference.

Yours Sincerely,

For and on behalf of
EI AUSTRALIA PTY LTD

Mariana Barbosa
Environmental Engineer

Nik Kontos
Principal Environmental Engineer