Douglas PARTNERS

GROUNDED EXPERTISE

WML-C130139-DOG-GEO-RPT-002[0]

Report on Targeted Contamination Assessment

Brookvale Westfield - AVAC Sewer pump station

Warringah Mall, 145 Condamine Street, Brookvale NSW

Prepared for Scentre Design & Construction Pty Ltd

Project 71015.55

10 July 2024

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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APPENDICES

Report on Targeted Contamination Assessment
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1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a Targeted Contamination Assessment undertaken for the proposed AVAC Sewer Pump Station (the site) at Westfield, Warringah Mall, 145 Condamine St, Brookvale NSW. The investigation was commissioned by email instruction to proceed dated 30 July 2023 from Micha Hinden of Scentre Design & Construction Pty Ltd and was undertaken in accordance with Douglas' proposal 71015.54.P.001.Rev2, dated 7 May 2024.

The objective of the targeted contamination assessment is to assess the suitability of the site for the proposed development, provide a preliminary in situ waste classification and acid sulfate soil assessment.

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

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

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013);
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020); and
- *Waste Classification Guidelines, Part 1: Classifying Waste*. NSW Environment Protection Authority (NSW EPA, 2014a).

The following key guidelines were consulted in the preparation of the acid sulfate soil assessment:

- Acid Sulfate Soil Management Advisory Committee (ASSMAC), *Acid Sulfate Soil Manual* (Stone, Ahern, & Blunden, 1998);
- QLD Department of Resources, QLD Department of Environment and Science, A*cid Sulfate Soil Technical Manual: Soil Management Guidelines, Version 5* (Dear, et al., 2023);
- Department of Agriculture and Water Resources (DAWR), *National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual* (Sullivan, et al, 2018a); and
- DAWR, *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual* (Sullivan, et al, 2018b).

2. Proposed development

It is proposed to construct a new vacuum pump station to replace the existing temporary system. The design of the new system is still in development but is understood include an above ground sewer pump station and an underground holding tank with associated service connections. It is understood that the connection between the new system and existing sewer may involve trenches or possibly an under bore extending from the proposed tank location. The inground tank is understood to be about 2.4 m by 3.0 m in plan dimensions and up to 6 m depth. Based on this, the maximum excavation depth for the development expected to be about 6 m.

The proposed development is located in the vicinity of a number of large stormwater culverts which cross the greater Warringah Mall site in a roughly northwest to southeast orientation. The provided drawings (SDC-42.0001, RevA and SDC-42.1001, RevA, Dated 06/06/24) and high-Level mark-up (CAR-060111, Rev6, dated22/11/2016) are included in Appendix E.

Figure 1 below shows an extract from the high-level mark-up provided.

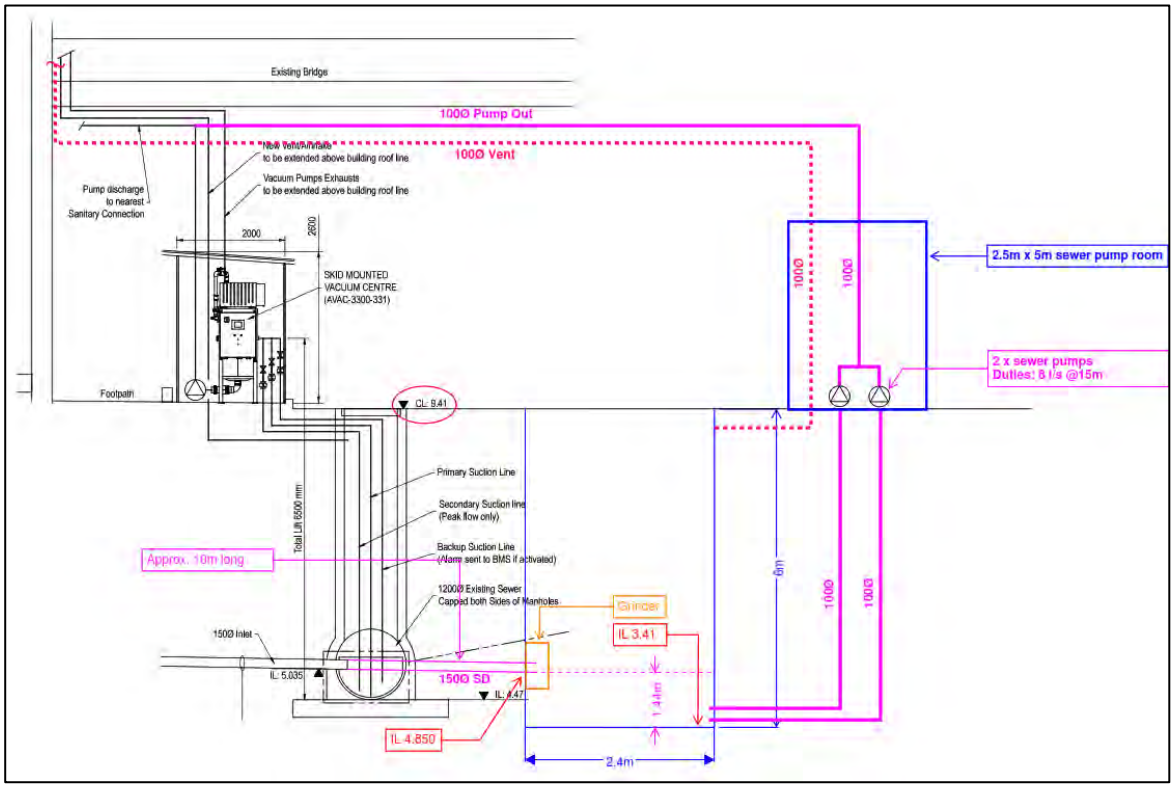

Figure 1: Extract of Sewer Pump Configuration from high level mark-up provided by Scentre Group

3. Scope of work

The investigation was undertaken concurrently with a geotechnical investigation, the results of which are report in *Report on Geotechnical Investigation, Westfield, Warringah Mall - AVAC Sewer Pump Station, Warringah Mall, 145 Condamine St, Brookvale NSW* (Douglas, 2024).

The scope of work for the contamination assessment comprised:

- Review of the relevant previous contamination assessment report/s;
- Collection of additional soil samples from the geotechnical boreholes (BH1 and BH2);
- Non-Destructive Digging (NDD) was required at both locations using a vacuum truck to a depth of 1.5 m due to the presence of services and therefore the recovery of fill samples was significantly limited;
- Screening of soil samples for volatile contaminants using a photo-ionisation detection (PID) instrument;
- Installation of a groundwater monitoring well at BH2;
- Development and sampling of the monitoring well at BH2 and previously installed groundwater monitoring well BH510;
- Despatch of selected soil and groundwater samples to a NATA accredited laboratory for analysis of:
    - TRH - total petroleum hydrocarbon;
    - BTEX - benzene, toluene, ethylbenzene, xylene;
    - PAH - polycyclic aromatic hydrocarbons;
    - PCB - polychlorinated biphenyls;
    - OCP - organochlorine pesticides;
    - OPP - organophosphorus pesticides;
    - VOC - volatile organic compounds;
    - PFAS - per- and poly-fluoroalkyl substances;
    - Asbestos (AFFA, soil only);
    - Iron (total and dissolved); and
    - Total dissolved and suspended solids (TDS and TSS, groundwater only).
- Analysis of replicate samples, rinsate samples (groundwater), trip spikes and trip blanks for QA / QC purposes;
- TCLP (PFAS) for waste classification purposes;
- Screening of samples for acid sulfate soil assessment followed by analysis of the chromium reducible suite; and
- Provision of this report.

4. Site information

Site address	Part of Warringah Mall, 145 Condamine Street, Brookvale NSW
Legal description	Part of Lot 103 Deposited Plan 1247294
Area	Approximately 200 m^2
Zoning	Zone E2 Commercial Centre

Local Council Area	Northern Beaches Council
Site Description	At the time of the investigation, the site was generally occupied by on-grade, asphaltic concrete (AC) carpark within the Warringah Mall Shopping Centre, adjacent to the multi-storey shopping mall buildings and associated multi-level parking structures to the west. The proposed sewer pump station and tank will underlie the existing AC carpark and concrete pedestrian traffic island.

The approximate site boundary is shown on Figure 2 and on Drawing 1, Appendix A.

Figure 2: Site location

5. Environmental setting

Site topography	The ground surface level is at approximately RL 9 m relative to the Australian Height Datum (AHD).
Soil landscape	The Sydney 1:100,000 Soil Landscape Sheet indicates that the site is underlain by disturbed terrain. Disturbed terrain can comprise fill soils of unknown origin and consistency.
Geology	Reference to the Sydney 1:100 000 Geology Series Sheet indicates that the subject site is underlain by stream alluvium and estuarine deposits comprising silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places and

	common shell layers. The alluvial deposits are underlain by Hawkesbury Sandstone.
Acid sulfate soils	Reference to the Acid Sulfate Soil Risk mapping (data supplied by NSW Department of Environment and Climate Change based on published 1:25,000 Acid Sulfate Soil Risk Mapping, 1994-1998) indicates that the subject site is underlain by soil with "low probability of occurrence" of acid sulphate soil (ASS). Reference to the Northern Beaches Council "Warringah Acid Sulfate Soils Map WLEP 2000" indicates the site in located in an area of "Class 4" Acid Sulfate soil risk, as shown in Figure 4 below. Class 4 indicates Acid sulfate soils are likely to be found beyond 2 metres below the natural ground surface.
Groundwater and Surface water	Brookvale Creek crosses through the Warringah Mall property (via a culvert), and surfaces in the Warringah Golf Course 50 m east of the property. Surface water and groundwater at the site is expected to discharge to Brookvale Creek and then Manly Lagoon. Groundwater levels have previously been measured at the property, indicating that the groundwater surface is near-level to gently sloping towards Brookvale Creek with groundwater levels varying from RL 5 m AHD to 12 m AHD. Several registered groundwater bores are located in the region. Of note are three "domestic" bores located approximately 350 m east and south-east of the site and one domestic well 350 m south-west of the site. The purpose of these wells is unknown but may include irrigation or drinking purposes.

6. Summary and discussion of previous investigations

6.1 Investigation of chlorinated ethene groundwater plume

Douglas has completed a number of previous investigations at the Warringah Mall Property (the property) which includes the site. The property was used primarily for market gardening and agricultural purposes and remained vacant up until the early 1960s when the shopping centre and some commercial / industrial properties were constructed. Extensions to the shopping centre and carpark have occurred over the past forty to fifty years. A dry cleaner (Littles Drycleaning) is located approximately 400 m west of the site at the western boundary of the Warringah Mall property.

Previous investigations have identified a chlorinated solvent groundwater plume below the Warringah Mall property. The plume has previously been identified beneath Littles Drycleaner and the shopping centre as well as the Ships Wheel, Starfish and Warringah Mall ChildCare Centre car parks. The concentrations of perchloroethene (PCE) and the daughter products trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) within the plume vary laterally and vertically.

Douglas undertook routine monitoring of the groundwater plume at the property between 2011 and 2014. The final round of groundwater monitoring under this programme was reported in Douglas *Report on Annual Groundwater Monitoring of July 2013, Warringah Mall, Old Pittwater Road, Brookvale*, Project 71015.29, dated October 2014 (Douglas, 2014).

The groundwater investigation included the installation of a number of groundwater wells throughout the Warringah Mall property to track the groundwater plume along its eastern trajectory from Littles Drycleaner approximately 400 m west of the current site (where PCE has been detected in groundwater a concentration of up to 6100 µg/L).

Approximately 150 m east of Little Drycleaner along the glide path of the plume the majority of the chlorinated ethene mass was in the form of Cis DCE with a concentration of up to 1500 µg/L (the result of natural attenuation) with little or no PCE present at that distance.

Sentry wells along the eastern boundary of the property were installed as part of the monitoring programme. The purpose of the sentry wells was to assess the potential advancement of the chlorinated ethene plume and whether the contaminated groundwater was close to migrating off site. Historically the leading edge of the chlorinated solvent plume was observed approximately 80 m west of the current site at monitoring well 512 (where VC was typically detected at a range of 5 to 48 µg/L and cis DCE at 3 to 14 µg/L).

The monitoring concluded that the plume was (and would continue) to attenuate naturally and therefore no active remediation of the groundwater plume was considered to be necessary at the time.

The sentry wells included previous groundwater well 510 (as shown on Drawing 1, Appendix B) located approximately 10 m south of the current site. PCE, TCE, DCE and VC were not detected at this location during the 3 year monitoring period. Therefore, there was no evidence to suggest that the chlorinated ethene plume had migrated to this location (and to the current site). It is noted however that further migration of the plume along its eastern trajectory towards the site may have occurred since the completion of the monitoring programme and / or proposed (or previous) dewatering activities could have drawn the plume further east.

Therefore, as part of this targeted investigation groundwater samples were collected from the groundwater well installed as part of this investigation (at BH2) and from the previous installed groundwater well at 510 to determine if there was evidence that the chlorinated ethene plume had reached the site.

6.2 Stage 2 Warringah Mall redevelopment works

In addition to the investigations related to the groundwater plume, Douglas has undertaken a contamination investigation for the Stage 2 Warringah Mall redevelopment works reported in *Phase 2 Contamination Assessment, Proposed Stage 2 Warringah Mall Redevelopment, Corner Condamine Street & Old Pittwater Road, Brookvale* (Douglas, 2018).

The Stage 2 redevelopment area covered an irregularly shaped area of approximately 2.2 ha at Warringah Mall and includes: the Red car park (previously the Sand Castle) and Purple car park (previously the Crab car park); and southern portions of Dale Street and Green Street as well as adjacent vehicle access car parks and a loading dock, works which included two test locations within the current site (test locations 757 and 755, refer to Drawing 1, Appendix B).

The relevant borehole logs from Douglas (2018) are presented in Appendix D. The relevant results of contamination testing from Douglas (2018) is presented in Tables F1 and F2 (Appendix F).

The conditions encountered in test locations 757 and 755 was described as:

Asphalt: to depths of 0.05 to 0.07 m bgl;

Fill: grey sand roadbase underlain by grey and brown sand with sandstone gravel to a depth of 0.7 m to 1.7 m bgl; underlain by

Sand: brown and grey sand to a depth of 3.0 m (borehole completion).

Groundwater was noted in borehole 755 at a depth of 2.7 m during augering.

Soil samples were collected and analysed for heavy metals, TRH, BTEX, PAH, OCP, PCB and asbestos ID. The results of the testing are discussed in Sections 11.1 and 11.3.

7. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e., it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Based on the previous reports, the following potential sources of contamination and associated contaminants of potential concern (CoPC) have been identified and summarised in Table 1.

Table 1: Summary of potential sources

Potential sources and associated CoPC
On-site sources
S1: Fill: Associated with levelling, demolition of former buildings on the site and potential burying of waste as evidenced in the site's environment protection licences. CoPC include metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos. **S2:** Former buildings. CoPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB. Note: previous investigations did not identify a significant risk from the previous agricultural land use. Therefore this is not considered to be a potential contaminant source with respect to the current site.
Off-site sources (broader Brookvale Mall property and / or surrounding land use)
S3: Commercial / Industrial land use at the Brookvale Mall property and surrounding area CoPC include metals, VOC, TRH, BTEX, PAH, PFAS **S4:** Dry cleaner (up-gradient) CoPC include drycleaning solvents and its daughter products (e.g. PCE, TCE, DCE and VC)

The following potential human and environmental receptors, along with relevant potential pathways, have been identified and summarised in Table 2.

Table 2: Summary of potential receptors and pathways

Potential human receptors
HR1: Current users [commercial (retail)] **HR2:** Construction and maintenance workers **HR3:** End users [commercial (retail)] **HR4:** Adjacent site users [commercial industrial and recreational – Warringah Golf Course]
Potential environmental receptors
ER1: Surface water [Brookvale Creek and then Manly Lagoon] **ER2:** Groundwater **ER3:** Terrestrial ecosystems
Potential pathways to human receptors
HP1: Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours
Potential pathways to environmental receptors
EP1: Surface water run-off **EP2:** Leaching of contaminants and vertical migration into groundwater **EP3:** Lateral migration of groundwater providing base flow to water bodies **EP4:** Inhalation, ingestion and absorption

Summary of potentially complete exposure pathways

A 'source–pathway–receptor' approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). The possible pathways between the above sources (S1 to S4) and receptors are provided in below Table 3.

Table 3: Summary of potentially complete exposure pathways

Source and CoPC	Exposure pathway	Receptor	Risk management action
S1: Fill: metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos **S2:** Former buildings: asbestos, synthetic	**HP1:** Ingestion and dermal contact **HP2:** Inhalation of dust and/or vapours	**HR1:** Current users [commercial (retail)] **HR2:** Construction and maintenance workers **HR3:** End users [commercial (retail)]	An intrusive investigation is recommended to assess possible contamination from the

Source and CoPC	Exposure pathway	Receptor	Risk management action
mineral fibres (SMF), lead (in paint) and PCB	**HP2:** Inhalation of dust and/or vapours	**HR4:** Adjacent site users commercial / industrial and recreational – Warringah Golf Course]	identified sources, including testing of the soils and groundwater. Due to the use of NDD supplementary testing of fill soils is recommended to provide a final waste classification
	EP1: Surface water run-off **EP3:** Lateral migration of groundwater providing base flow to water bodies	**ER1:** Surface water (Brookvale Creek)	
	EP2: Leaching of contaminants and vertical migration into groundwater	**ER2:** Groundwater	
	EP4: Inhalation, ingestion and absorption	**ER3:** Terrestrial ecosystems	
S3: Commercial / Industrial land use at the Brookvale Mall property and surrounding area CoPC include metals, VOC, TRH, BTEX, PAH, PFAS **S4:** Dry cleaner (up-gradient)	**HP1:** Ingestion and dermal contact	**HR2:** Construction and maintenance workers **HR4:** Adjacent site users commercial / industrial and recreational – Warringah Golf Course]	
	HP2: Inhalation of dust and/or vapours	**HR1:** Current users [commercial (retail)] **HR2:** Construction and maintenance workers **HR3:** End users [commercial (retail)] **HR4:** Adjacent site users [commercial / industrial and recreational (Warringah Golf Course]	
	EP3: Lateral migration of groundwater providing base flow to water bodies	**HR4:** Adjacent site users [commercial / industrial and recreational (Warringah Golf Course] **ER1:** Surface water **ER3:** Terrestrial ecosystems	

8. Sampling plan

8.1 Data quality objectives

The investigation was devised with reference to the seven-step data quality objectives (DQO) process which is provided in Appendix B Schedule B2, NEPC (2013). The data quality objective process is outlined in Appendix C.

8.2 Soil sampling rationale

Based on the CSM and DQO the following sampling rationale was adopted.

A judgemental sampling strategy to determine borehole locations, to supplement the previous locations discussed in Section 6, was adopted to target the proposed location of the AVAC system with consideration to site access restrictions, underground service risks, and traffic management. Borehole locations are shown on Drawing 1, in Appendix B. Fieldwork comprised:

- Service scanning to clear the borehole locations of buried services, undertaken by personnel engaged by Scentre Group;
- Non-Destructive Digging (NDD) at two boreholes (BH1 and BH2), using a vacuum truck together to depth of 1.5 m below existing ground surface;
- The boreholes were then extended to weathered rock at depths between 5.35 m (BH1) to 6 m (BH2), using a bobcat mounted drilling rig and using solid flight augers;
- BH1 and BH2 were then extended to depths between 9.0 m to 9.6 m below ground level respectively using NMLC diamond coring equipment to recover continuous rock core samples; and
- Installation of one groundwater monitoring well in a second location drilled next to BH2.

Limited sample recovery was possible in the top 1.5 m due to the use of NDD methods. Consequently, only one sample of fill could be recovered from BH2 at a depth of 0.35 to 0.5 m. Soil samples were collected between 1.5 m bgl and the top of weathered bedrock at regular intervals.

The general sampling methods are described in the field work methodology, included in Appendix G.

Soil samples were analysed for the identified contaminants of concern (VOC, metals, PAH, TRH, BTEX, OCP, OPP, PCB, phenols, asbestos and PFAS). It is noted that the necessary used of NDD limited the recovery of fill samples and therefore sample selection was informed by the samples that could be recovered which included one fill sample and underlying natural soils, including samples at the observed water table (where the risk of VOC, chlorinated ethenes associated with the groundwater plume was greatest). Due to the limited recovery of fill samples, the analysis of the fill was supplemented with previous data from (fill sampling) from Douglas (2018).

8.3 Groundwater sampling rationale

In order to assess the current groundwater contamination status at the site and evaluate whether historical / current / off-site land uses have impacted on groundwater, sampling from two monitoring wells (BH2 and 510) was undertaken.

The locations were selected based on the following rationale:

- BH2 is located within the proposed AVAC system footprint to determine groundwater levels within the proposed works area and assess potential contaminants in groundwater with respect to potential dewatering activities; and
- Previous groundwater well 510 which is located 10 m south of the current site. BH510 was installed to act as a sentry well in relation to the chlorinated ethene plume identified at the site. Sampling of this location was undertaken to assess if there was evidence that the groundwater plume had migrated with the potential to impact upon the proposed AVAC system.

The general sampling methods are described in the field work methodology, included in Appendix G. It is noted that on the field sheets and laboratory certificates BH2 is incorrectly identified as BH1, however the groundwater well and subsequent samples were installed / collected at BH2.

8.4 Acid sulfate soil field and laboratory testing

8.4.1 Rationale

Sullivan, et al. (2018b) recommends for the anticipated disturbance of ASS, a minimum of two boreholes to be drilled within the proposed disturbance area to a depth 1 m beyond proposed disturbance depth. Accordingly, the sampling rationale that was adopted is two boreholes with sampling undertaken to the top of weathered bedrock within the area of the proposed disturbance.

8.4.2 Field work methodology

Field work comprised:

- Collection of soil samples for ASS screening of at least one sample for every change in strata observed; and
- Placement of samples immediately into zip-lock plastic bags after minimising air content and potential for moisture loss and immediately place on ice in a cooled, insulated and sealed container for transport to the laboratory.

8.4.3 Field and laboratory testing

Based on the field screen results, S_{Cr} suite tests was undertaken on representative (including 'worst case' – low pH_F / pH_{Fox} or high pH drop between pH_F and pH_{Fox}) samples. Laboratory testing was undertaken by a NATA accredited laboratory. The number of samples tested, as recommended by Sullivan, et al (2018b), is summarised in the table below.

Table 4: Summary of testing frequency

Test method	Number of tests
Field screen (test): pH_F and pH_{Fox}	9
Chromium reducible sulfur (S_{cr}) method)	5

9. Site assessment criteria

9.1 Site contamination

The site assessment criteria (SAC) applied in the current investigation are informed by the CSM (Section 7) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic commercial / industrial land use scenario. The derivation of the SAC is included in Appendix E and the adopted SAC are listed on the summary analytical results tables in Appendix F.

9.2 Waste classification

The waste classification was prepared with reference to:

- NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a).
- NSW EPA *Waste Classification Guidelines, Part 2: Immobilisation of Waste* (NSW EPA, 2014).
- NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014b).
- NSW EPA *Addendum to the Waste Classification Guidelines (2014) - Part 1: Classifying Waste* (NSW EPA, 2016).

9.3 Acid sulfate soils

The ASS pH_F and pH_{Fox} screening test results were assessed for the possible presence of ASS conditions. It should be noted that ASS screening tests are a qualitative screening test which provides a preliminary indication of the presence of ASS conditions. The results of which were used to guide the selection of samples for laboratory analysis.

Acid base accounting (ABA) via the S_{Cr} test, is a quantitative measurement and takes precedence over the screening test results when evaluating the presence or absence of ASS. The S_{Cr} results can also be used to correlate with the pH_F and pH_{Fox} screening test results.

The relevant assessment criteria from Sullivan, et al. (2018a), are summarised in Table 5 below (and the summary results table in Appendix F, Table F3). The anticipated disturbance of ASS is less than 1000 tonnes and this volume, along with the anticipated soil type (sand), was considered in the derivation of the action criterion.

Table 5: Assessment criteria

Assessment criteria and associated test	Units	Threshold
Screening test assessment criteria pH_F and pH_{Fox}	pH_F	<4[1]
	pH_{FOX}	<3[2]
	ΔpH_F	>1
Action criterion: S_{Sr} net acidity / sulphur trail (%)<1000 tonnes Sands to loamy sands	$\%S_{Oxidisable}$	≥0.03

Notes: pH_F = non-oxidised pH
pH_{FOX} = oxidised pH
ΔpH_F = pH_F minus pH_{FOX}
[1] Indicative value only for actual acid sulfate soil (AASS)
[2] Indicative value only for potential acid sulfate soil (PASS)

10. Results

10.1 Field work results

The borehole logs for this assessment are included in Appendix D. The logs recorded the following general sub-surface profile:

Pavement / Fill — Generally comprised 60 mm of asphaltic concrete (AC) or, 150 mm of concrete pavement over 200 mm of AC pavement overlying fill comprising cemented road base and silty clay with trace sandstone and ironstone gravels to depths of up to 1.4 m.

Alluvial Soil: — Very loose and loose organic clayey and peaty sand, with occasional quartz gravel, encountered to depth of between 5.4 m and 4.0 m.

Very soft clay with peat and sand encountered below the alluvial sands in BH2 only at 4.0 m to a depth of 5.2 m.

Extremely Weathered Sandstone: — Very dense fine to coarse grained clayey sand and possibly very low strength rock encountered below the alluvial soils to depth of about 6 m.

Sandstone: — Fine to coarse grained, slightly to moderately weathered Hawkesbury Sandstone encountered at depths between 5.9 m to 6.0 m and extending to the maximum investigation depth of 9.6 m. Initially very low to low strength, improving to medium strength from about 7.9 m to 8.2 m.

No visual or olfactory evidence (e.g., staining, odours, free phase product) was observed during the field investigations to suggest the presence of contamination within the soils or groundwater at the site.

The PID screening recorded values of less than 5 ppm suggesting the absence, or very low concentrations, of VOC in the samples tested.

Groundwater seepage was noted at about 2.6 m in BH2 completion of augering. The necessary use of water as a drilling fluid precluded the observation of groundwater during coring.

After installation, the groundwater monitoring well installed within BH2 and the previous investigation borehole BH510 were purged of drilling fluid and water using a submersible pump and digital data loggers were installed to monitor recharge of the groundwater. A summary of the well construction details and groundwater measurements taken following installation of the groundwater wells are presented in Table 6 below.

Table 6: Well construction details and groundwater levels

BH Ref	Ground surface level (m AHD)	Filter zone depth (m)	Depth of water (m bgl)	Groundwater level (m AHD)	Filter zone material
BH2	8.9	2.2 – 5.5	2.52	6.38	Alluvial soil
BH510	8.6	3.0 – 6.0	3.86	4.74	Alluvial soil

Notes:
*Surveyed by dGPS
AHD – Australian Height Datum
SWL – standing water level
bgl – below ground level
Groundwater levels measured on 5 June 2024

Based on the groundwater level measurements and previous Douglas investigations, groundwater is interpreted to be flowing to the west towards Brookvale Creek and Manly Lagoon. Brookvale Creek runs below the site (in a culvert) and surfaces 50 m south-east of Warringah Mall in Warringah Golf Course. The creek flows into Manly Lagoon.

The stabilised groundwater field parameters recorded prior to sampling are shown on the groundwater field sheets included in Appendix D and summarised below.

Physical parameters were measured whilst sampling (where possible) and are summarised in Table 7.

Table 7: Summary of field parameters (groundwater 5 June 2024)

Well / Sample ID	Temp. (°C)	DO (ppm)	EC (µS/cm)	pH	Redox (mV)	Turbidity (ntu)
BH2	21.7	0	1157	6.15	-110.7	870
510	20.5	0	511	5.75	-187.7	21

The dissolved oxygen levels indicated generally anaerobic conditions. The pH was slightly acidic. The electrical conductivity values are typical of fresh water. Redox potential (Eh) indicates slightly reducing conditions.

No light non-aqueous phase liquid (LNAPL) was observed whilst sampling and no LNPAL or dense phase non-aqueous phase liquid (LNAPL) was detected by the interface probe.

10.2 Laboratory analytical results

The results of laboratory analysis are summarised in the following tables in Appendix F:

- Table F1: Summary of results of soil analysis;
- Table F2: Waste Classification Assessment;
- Table F3: Summary of Acid Sulfate Soil Results; and
- Table F4: Summary of Groundwater Results.

The laboratory certificates of analysis together with the chain of custody and sample receipt information are provided in Appendix H.

11. Discussion

11.1 Soils

The analytical results for all contaminants tested / contaminant(s) from the current investigation and relevant test locations of Douglas (2018), locations 755 and 757 were all within the adopted site assessment criteria.

It is noted that the current investigation included limited testing of the fill (due to the use of NDD methods). However, Douglas (2018) did include analysis of two samples of fill from the site, which bolsters the data set and therefore it is considered that risk of significant soil contamination within the site is low. That notwithstanding Douglas recommends further sampling and analysis of the fill for waste classification purposes upon excavation.

11.2 Acid sulfate soils

Based on the testing and the lithology observed at the site, the following is noted for the field screening results:

- pH_F was within the threshold criterion (<4 pH units, indicative of actual ASS) in all samples, ranging from 6.6 to 7.6 pH units;
- pH_{FOX} was below the threshold criterion (<3.0 pH units, indicative of potential ASS) in eight of the nine samples tested with a range of 2.1 to 3.0 pH units; and
- All samples exceeded the threshold criterion for the drop in pH_F (>1 pH units), ranging from 3.6 to 5.0 pH units.

The S_{Cr} test results indicated that four of the five samples exceeded the action criterion for net acidity of >0.03% S. The exceedances ranged from 0.041% S to 0.084% S.

Taking into consideration the ASS results and cross-referencing of borehole logs, the S_{Cr} results suggest that ASS is present at the site at depths of between 1.4 m bgl and 6.0 m bgl (the top of bedrock) and is likely to be associated with the alluvial deposits across the site. It is noted that due to the use of NDD which precluded the collection of samples from the fill for acid sulfate soil testing it is recommended that a precautionary approach be adopted and the fill be treated as potential ASS and managed accordingly. If the fill can be segregated from the underlying natural soils it may be possible to undertake additional confirmatory testing on the fill upon excavation to confirm the presence or absence of potential ASS.

Given that the proposed development requires the excavation of soils, ASS will be encountered (excavated) during the proposed works.

11.3 Preliminary waste classification

The following Table 9 presents the results of the six-step procedure outlined in NSW EPA (2014) for determining the type of waste and the waste classification. This process applies to the fill at the site, noting however the limited sampling to date.

Table 9: Six step classification procedure

No.	Item	Comment	Rationale
1.	Is the waste special waste?	No	No asbestos-containing materials (ACM), clinical or related waste, or waste tyres were observed in the boreholes. Asbestos was not detected by the analytical laboratory.
2.	Is the waste liquid waste?	No	The fill comprised a soil matrix.
3.	Is the waste “pre-classified”?	No	The fill is not pre-classified with reference to NSW EPA (2014).
4.	Does the waste possess hazardous waste characteristics?	No	The fill was not observed to contain or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances, corrosive substances, coal tar, batteries, lead paint or dangerous goods containers.
5.	Determining a wastes classification using chemical assessment.	Conducted	Refer to attached Table F3, Appendix F
6.	Is the waste putrescible or non-putrescible? [1]	Putrescible / Non-putrescible	The fill does not contain material considered to be putrescible.

Notes:
1. Wastes that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials (NSW EPA, 2014).

As shown in Table F2, Appendix F, all contaminant concentrations for the analysed fill samples were below the contaminant thresholds (CT1) for general solid waste.

Therefore, the fill at the site is provisionally classified as General Solid Waste (non-putrescible). Due to the limited sample recovery of the fill during the current investigation due to the use of NDD methods further *ex situ* assessment is required to confirm the classification prior to disposal.

The following Table 10 presents the results of the assessment of natural soil at the site with reference to the virgin excavated natural material (VENM) definition in the POEO Act and the EPA website. The below classification does not apply to the bedrock underlying the site which has not been assessed as part of this investigation.

Table 10: VENM classification procedure

No.	Item	Comment	Rationale
1.	Is the material natural?	Yes	Natural soil logged in the test bores (refer to Section 10.1). These materials underlie the fill at the site.
2.	Are manufactured chemicals or process residues present?	No	There were no visual or olfactory indicators of chemical contamination of the materials in the test bores. Concentrations of contaminants were considered to be typical of background concentrations (Table A1).
3.	Are sulfidic ores or soils present?	Yes	Refer to Section 11.2
4.	Are there current or previous land uses that have (or may have) contaminated the materials?	No	Previous land uses may have impacted on surface soils overlying the materials. Low chemical concentrations indicate no likely impact on the natural materials.

As shown in the attached Table F2, all contaminant concentrations for the analysed natural soil samples were generally within the typical background concentrations. However, PCB was detected in sample BH02/1.4-1.6 at a concentration of 0.2 mg/kg.

Furthermore, potential acid sulfate soil was detected in the natural alluvial soils. Therefore, the alluvial soils from a depth of 1.5 m bgl to a depth of up to 6.0 m bgl cannot be classified as VENM. The alluvial soil will require treatment (liming) and validation in accordance with an acid sulfate soil management plan (ASSMP) prior to disposal. Upon successful treatment of acid sulfate soils it is likely that the natural soil would be classifiable as general solid waste.

11.3.1 Conditions

This preliminary classification is not to be used for waste disposal. Further work is required before a formal classification suitable for waste disposal can be provided. The waste classification is to be confirmed by a qualified environmental consultant including visual and analytical assessments.

If any fill / soil / rock is encountered which is different to that sampled and tested or exhibit signs of potential contamination (e.g., anthropogenic inclusions, staining or odours) this waste classification does not apply and the advice of a qualified environmental consultant should be sought.

Both the receiving site and the site disposing of the fill / soil / rock should satisfy the requirements of the licence of the receiving site before disposal of the fill / soil / rock is undertaken. Note that appropriate prior arrangement with the receiving site/relevant authorities should be obtained prior to the disposal of any fill / soil / rock off site. The receiving site should check to ensure that the fill / soil / rock received matches the description provided in this report and contains no cross contamination. The handling, transport and disposal of the waste should be conducted in accordance with regulatory and statutory requirements.

11.4 **Groundwater**

As shown in Table F4, Appendix F, all analyte concentration were below the SAC, with the exception of:

- Iron in sample BH2, total (24,000 µg/L) and dissolved (16,000 µg/L) exceeded the ADWG health and irrigation screening levels. ANZG (2018) states that there is insufficient data at this stage to derive a reliable trigger value for iron but recommends that the current Canadian guideline level (of 300 µg/L) can used as an interim indicative working level. Iron was also in excess of the working level;
- PFOS (0.008 µg/L), in sample BH2 exceeded the HEPA 99% protection level (0.000238 µg/L); and
- A number of analytes (PAHs, OPPs and VOCs) had laboratory detection limits that exceeded some of the adopted screening levels however these are not considered to be significant.

Chlorinated ethenes (PCE, TCE, DCE and VC) were below the laboratory detection limit. Therefore, is it considered that there is no evidence that the chlorinated ethene plume has migrated to the proposed site of the AVAC system.

It is noted that dewatering has the potential to draw the chlorinated ethene plume towards the site of the AVAC system. Therefore, it is recommended that routine groundwater monitoring be undertaken during the dewatering process (at BH2 and 510, or new wells if these wells cannot be retained during dewatering) to monitoring potential impacts.

The concentrations of iron, PFOS and TSS do not warrant the need for remediation of groundwater, however, prior to disposal of groundwater, treatment will be required, particularly if groundwater is disposed to stormwater.

Typical treatment options may include the use of a settling tank or filtration tank (including activated carbon for PFAS) and the application of a flocculating agent.

The analytical results suggest that groundwater beneath the site has not been significantly impacted by organic contaminants TRH, PAH, OCP, OPP, PCB, phenol or BTEX.

11.5 **Data quality assurance and quality control**

The data quality assurance and quality control (QA / QC) results are included in Appendix I. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

12. Conclusions and recommendations

Based on the results of the targeted contamination assessment it is considered that the site is suitable for the proposed AVAC system subject to implementation of the following recommendations:

- Further *ex situ* waste classification of fill excavated during the works to confirm the classification prior to disposal;
- Preparation of an unexpected finds protocol be prepared to address potential unexpected contamination finds during redevelopment such as asbestos;
- Preparation and implementation of an acid sulfate soil management plan (ASSMP). The ASSMP will outline the necessary protocols to treat (e.g., lime-dose) and manage the ASS upon excavation to mitigate the acid generating potential of the soils:
    - Post-treatment verification testing requirements will be outlined in the ASSMP and successfully treated soils can typically be re-used on site. Any off-site disposal of treated ASS is subject to the requirements of NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a) and NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014b).
- Appropriate treatment of groundwater extracted during dewatering to iron and PFAS prior to disposal. It is recommended that a dewatering management plan be prepared (per the recommendations of the geotechnical report (Douglas 2024) that outlines an appropriate monitoring plan to monitor the potential draw the chlorinated ethene plume towards the site. The dewatering plan should also consider the requirements of acid sulfate soil management (minimising the zone of influence to minimise the potential for acid sulfate soil generation) outside the excavation area).

13. References

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Sullivan, et al. (2018b). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual*. Canberra ACT CC BY 4.0: Sullivan, L; Ward, N; Toppler, N; Lancaster, G, Department of Agriculture and Water Resources.

14. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at Warringah Mall, 145 Condamine St, Brookvale NSW in accordance with Douglas' proposal 71015.54.P.001.Rev2, dated 7 May 2024 and acceptance received from Micha Hinden dated 30 July 2023. The work was carried out under contract No.: 14635, dated 15 May 2024). This report is provided for the exclusive use of Scentre Design & Construction Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and / or their agents.

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

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

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

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in fill materials at the test locations sampled and analysed. The use of NDD methods limited the sampling and observation of the fill during. Fill was observed to a depth of up to 1.4 and asbestos has previously been detected in other parts of the Warringah Mall the risk of asbestos in previous below-ground fill cannot be ruled out.

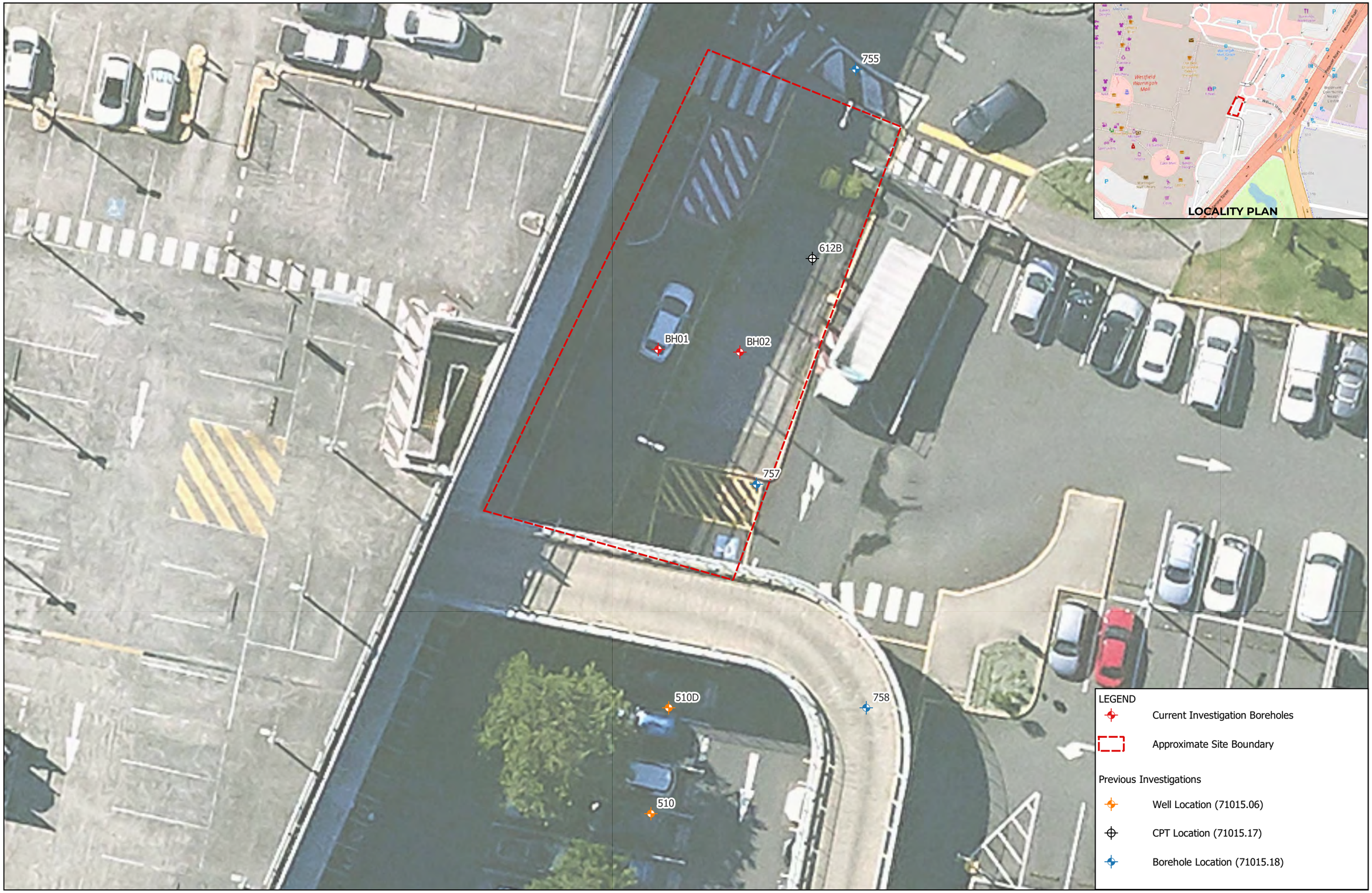
Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling [where appropriate], or to vegetation preventing visual inspection and reasonable access [where appropriate]. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

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

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

Appendix A

Drawings



REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	10.07.2024	EC

SCALE: 0 2 4 6 8 10 m
1:200 @ A3

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

CLIENT:
Scentre Design & Construction Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 25.03.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Brookvale Westfield - AVAC Sewer Pump Station

PROJECT ADDRESS:
Warringah Mall 145 Condamine St, Brookvale

DRAWING TITLE:
TEST LOCATION PLAN

PROJECT NO: **710015.54**
DRAWING NO: **1**
REVISION: **0**

Appendix B

About This Report

About this Report

November 2023

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

continued next page

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

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Appendix C

Data Quality Objectives

1. Data quality objectives

The DSI has been devised broadly in accordance with the seven-step data quality objectives (DQO) process which is provided in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

Table 1: Data quality objectives

Step	Summary
1: State the problem	The objective of the investigation is to assess the contamination status of the site with respect to the proposed land use, provide an *in situ* waste classification, and assess acid sulphate soil conditions. The site shall remain a commercial shopping centre. The proposed development will comprise the construction of a new vacuum pump station. A preliminary conceptual site model (CSM) has been prepared (Section 7) for the proposed development. The project team consisted of experienced environmental engineers and scientists working in the roles of Project Principal, Project Reviewer, Project Manager and field staff.
2: Identify the decisions / goal of the study	The site history has identified possible contaminating previous uses which are identified in the CSM (Section 7). The CSM identifies the associated contaminants of potential concern (CoPC) and the likely impacted media. The site assessment criteria (SAC) for each of the CoPC are detailed in Appendix E. The decision is to establish whether or not the results fall below the SAC. On this basis, an assessment of the site's suitability from a contamination perspective will be derived and a decision made on whether (or not) further assessment and / or remediation will be required.
3: Identify the information inputs	Inputs will be the analytical results for the CoPC (identified in the CSM, Section 7) from NATA accredited laboratories and methods, where possible. The SAC for each of the CoPC are detailed in Appendix E. A photo-ionisation detector (PID) was used on-site to screen soils for VOC. PID readings were used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The lateral boundaries of the investigation area are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment and site observations. The assessment is limited to the timeframe over which the field works were undertaken. Constraints to the assessment are identified and discussed in the conclusions of the report.

Step	Summary
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the SAC (Appendix E, based on NEPC (2013)). Where guideline values are absent, other sources of guideline values accepted by NEPC (2013) shall be adopted where possible. Where a sample result exceeds the adopted criterion, a further site-specific assessment will be made as to the risk posed by the presence of that contaminant(s). Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPD values should generally be below 30%; for field blanks and rinsates, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Appendix I.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site exceed the human health and environmental SAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site comply with the human health and environmental SAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true.
7: Optimise the design for obtaining data	As the purpose of the investigation is to assess the contamination status of the site, the sampling program is reliant on professional judgement to identify and sample the potentially affected areas. The sampling program was more opportunistic than optimum, and therefore a recommendation for further testing is provided in the report. Further details regarding the proposed sampling plan are presented in Section 8.

2. References

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

Appendix D

Fieldwork Results

Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

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

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

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

Abbreviation Codes

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

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

Data Integrity Codes

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

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

Graphic Symbols

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

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

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

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

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

Particle size designation and Behaviour Model

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

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

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

[1] – refer grain size subdivision descriptions below

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

Component proportions

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

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

[1] As defined in AS1726-2017 6.1.4.4

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

Composite Materials

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

Soil Descriptions

Classification

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

Soil Name

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

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

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

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

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

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

Identification of minor components

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

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

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

Soil Composition

Plasticity

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

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

Grain Size

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

Grading

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

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

Soil Condition

Moisture

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

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

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

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

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

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

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

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

Consistency (fine grained soils)

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

Relative Density (coarse grained soils)

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

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

Compaction (anthropogenically modified soil)

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

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

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

Soil Origin

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

Cobbles and Boulders

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

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

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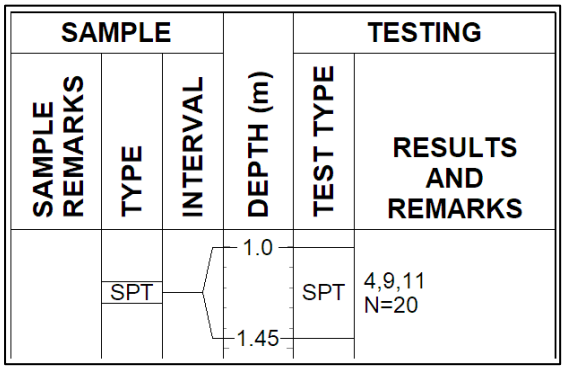
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

March 2024

Sampling and Testing

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



Sampling

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

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

[1] – numeric suffixes indicate tube diameter/width in mm

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

Field and Laboratory Testing

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

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

Field and laboratory testing (continued)

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

Groundwater Observations

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

Drilling or Excavation Methods/Tools

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

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

[1] – numeric suffixes indicate tool diameter/width in mm

Douglas PARTNERS

BOREHOLE LOG

CLIENT: Westfield Design and Construction Pty Ltd
PROJECT: Contamination Assessment
LOCATION: Warringah Mall, Brookvale

SURFACE LEVEL: 8.74 AHD
EASTING: 339548.41
NORTHING: 6262248.54
DIP/AZIMUTH: 90°/--

BORE No: 755
PROJECT No: 71015.18
DATE: 30/4/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.05	ASPHALT							
		FILLING - brown, sandy gravel filling (roadbase)		E	0.4 0.5		PID<1 ppm		
	0.5	FILLING - grey, sand filling with trace roots		E	0.9 1.0		PID<1 ppm		
				E	1.4 1.5		PID<1 ppm		
	1.7	CLAY - soft, dark brown, clay with trace silt, moist		E	1.9 2.0		PID<1 ppm		
	2.2	SAND - brown and grey, medium grained sand with trace clay, moist to wet - saturated from 2.7m						▼	
	3.0	Bore discontinued at 3.0m - target depth reached		E	2.9 3.0		PID<1 ppm		

RIG: Bobcat **DRILLER:** S. Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 2.7m whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Westfield Design and Construction Pty Ltd
PROJECT: Contamination Assessment
LOCATION: Warringah Mall, Brookvale

SURFACE LEVEL: 8.59 AHD
EASTING: 339542.89
NORTHING: 6262225.44
DIP/AZIMUTH: 90°/--

BORE No: 757
PROJECT No: 71015.18
DATE: 30/4/2013
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.07	ASPHALT							
		FILLING - brown, gravelly sand filling (roadbase)		E	0.4		PID<1 ppm		
	0.5	FILLING - light brown, sand filling with some sandstone fragments (ripped sandstone)		E	0.5		PID<1 ppm		
	0.7	SAND - dark brown, fine to medium grained sand with trace clay, humid			0.7				
				E	0.9 1.0		PID<1 ppm		
	1.2	CLAYEY SAND - brown, fine to medium grained clayey sand, damp		E	1.4 1.5		PID<1 ppm		
	1.6	CLAY - soft, brown clay with trace sand, moist		E	1.9 2.0		PID<1 ppm		
	2.3	SAND - brown, medium grained sand, damp		E	2.9 3.0		PID<1 ppm		
	3.0	Bore discontinued at 3.0m - target depth reached							

RIG: Bobcat **DRILLER:** S. Gregor **LOGGED:** DW **CASING:** Uncased

TYPE OF BORING: 100mm diameter solid flight auger

WATER OBSERVATIONS: No free groundwater observed whilst drilling

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21
SURFACE LEVEL: 9.1 AHD
COORDINATE: E:339537.4, N:6262232.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH1
PROJECT No: 71015.54
DATE: 27/05/24 - 28/05/24
SHEET: 1 of 2

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	9.04 / 0.06	ASPHALTIC CONCRETE PAVEMENT: 60 mm thick.										
		FILL / Silty Gravelly SAND: grey-brown; fine to medium; low plasticity silt; fine to medium, blue metal gravel. Cemented road base.		FILL	ND	ND						
	7.70 / 1.40	Clayey SAND, trace gravel; fine to coarse; low plasticity clay; fine to medium, quartz gravel.		ALV			PFAS	A/ES		1.40	PID	2.5ppm
								ES		1.90	PID	1.6ppm
		From 1.40m: Organic odour								2.00		
	6.75 / 2.35	Peaty SAND, with silt, trace gravel: dark grey; fine to coarse; coarse, quartz gravel.			L	M		ES		2.40	PID	1.2ppm
										2.50	PID	1.3ppm
								SPT			SPT	2,2,3 N=5
										2.90		0ppm
								ES		3.00	PID	
								ES		3.40	PID	0ppm
				ALV						3.50		
								ES		3.90	PID	0ppm
										4.00	PID	1.2ppm
								SPT			SPT	1,0,1 N=1
					VL	W				4.45		
		5.10m: Very low 'TC' bit resistance										
	3.75 / 5.35	Continued as rock										2/0 (HB)

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

PLANT: Bobcat
OPERATOR: Ground Test (JJ)
LOGGED: CSY
METHOD: DT to 1.4m, VE to 1.5m, AD/T to 5.35m, NMLC to 9.00m
CASING: HWT to 5.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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

BOREHOLE LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21
SURFACE LEVEL: 9.1 AHD
COORDINATE: E:339537.4, N:6262232.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH1
PROJECT No: 71015.54
DATE: 27/05/24 - 28/05/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED												SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (DW: PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (<0.06, 0.06-0.2, 0.2-0.6, 0.6-2, >2)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	9	0																	
	8	1													1				
	7	2													2				
	6	3													3				
	5	4													4				
	4	5													5				
		5.39	Continued from soil As below after 5.88m			5.35 5.39					5.35m: , Unless otherwise stated below, rock is fractured along rough, stained, planar bedding dipping at 0 -15 degrees.								
		5.88				5.88													
	3	6	SANDSTONE: pale grey, fine to coarse grained, bedded, 0 to 15°; with extremely weathered seams, and sub-rounded quartz gravel inclusions up to 8 mm diameter. Hawkesbury Sandstone		SW		VL to L	84	63		6.05m: DS, 10°, 60mm 6.11m: IS, 3°, 5 mm 6.27m: DS, 0°, 50mm				6	PLT	PL(A)=0.06MPa		
	2	7													7				
	1	8				8.18	M	100	70		8.25m: CS, 10°, 60mm 8.62m: IS, 5°, 42mm 8.71m: DS, 0°, 24mm 8.79m: DS, 0°, 3mm				8	PLT	PL(A)=0.2MPa		
	0	9	Borehole discontinued at 9.00m depth. Target Depth Reached.													PLT	PL(A)=0.4MPa		

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

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

PLANT: Bobcat
METHOD: DT to 1.4m, VE to 1.5m, AD/T to 5.35m, NMLC to 9.00m
REMARKS:
OPERATOR: Ground Test (JJ)
LOGGED: CSY
CASING: HWT to 5.5m

Refer to explanatory notes for symbol and abbreviation definitions

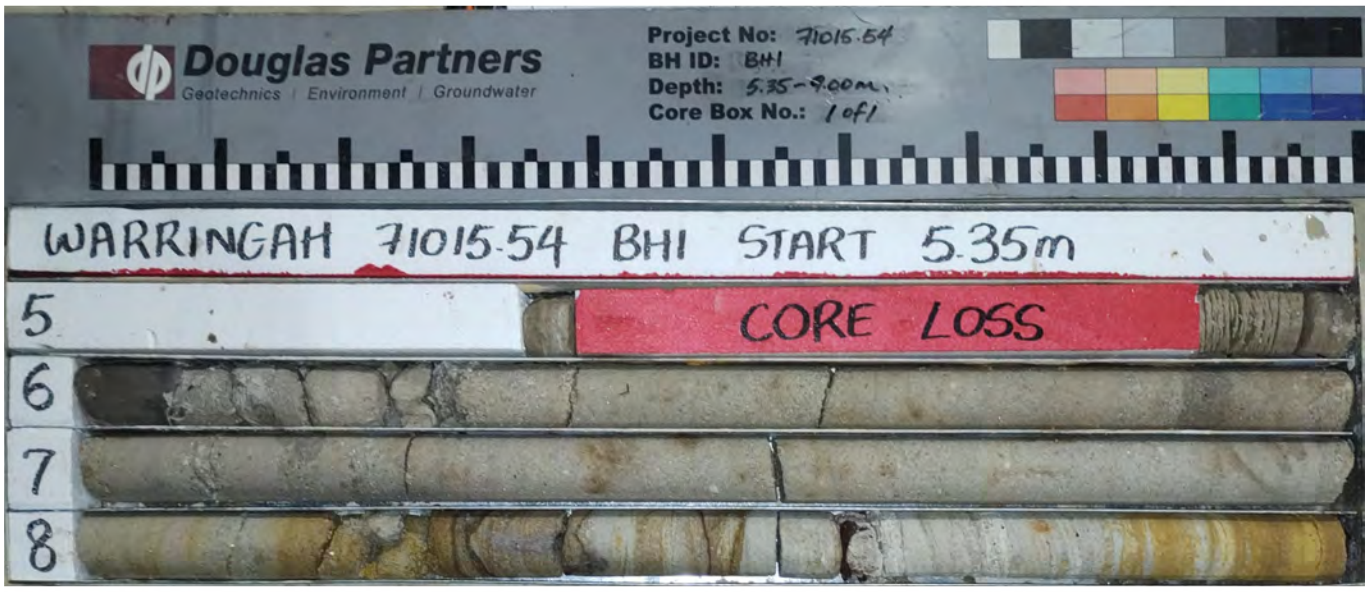
Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21

SURFACE LEVEL: 9.1 AHD
COORDINATE: E:339537.4, N:6262232.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH1
PROJECT No: 71015.54
DATE: 27/05/24 - 28/05/24
SHEET: 1 of 1



BOREHOLE LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21
SURFACE LEVEL: 8.9 AHD
COORDINATE: E:339542.0, N:6262232.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 71015.54
DATE: 28/05/24 - 29/05/24
SHEET: 1 of 2

CONDITIONS ENCOUNTERED								SAMPLE			TESTING AND REMARKS			
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE		REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL / WELL PIPE
	0.15	CONCRETE PAVEMENT: 150 mm thick.			ND	ND								
	0.35	ASPHATIC CONCRETE PAVEMENT: 200 mm thick.		FILL	(MC)	w=PL			ES		0.35	PID	2.7ppm	Gravel
	0.50	FILL / Silty CLAY, trace gravel: red-brown mottled brown; medium to high plasticity; fine to medium, sandstone and ironstone gravel.		FILL	ND	ND					0.50			
	1.40	FILL / Gravelly SAND, with silt; fine to coarse; fine to coarse, blue metal gravel; Cemented road base.							ES		1.40	PID	2.1ppm	
		Clayey SAND, with silt, trace gravel: dark grey; fine to medium; low plasticity clay; fine to medium, quartz gravel.		ALV	L	M					1.60			
									ES		1.80	PID	0ppm	Bentonite
Observed on completion of auger drilling 27/05/24 0100											2.00			
									ES		2.30	PID	0ppm	
											2.50			
									SPT		2.80	SPT	1,3,3 N=6	
													0ppm	
									ES		3.00	PID		
	4.00	CLAY, with peat, with sand: dark grey; low plasticity; fine to coarse sand; Strong organic odour.		ALV	VS	W			ES		3.50	PID	0ppm	
											3.80			
									ES		3.90	PID	0ppm	
											4.00			
									SPT		4.30	SPT	0 1 blow sunk > 450 mm	
													0ppm	
									A/ES		4.50	PID		
									ES		4.80	PID	0ppm	
											5.00			
	5.20	Clayey SAND, with silt: pale grey; fine to coarse; low plasticity clay.		XWM	(D)				ES		5.20	PID	0ppm	Gravel
	5.50	Continued as rock							SPT		5.30 5.41	SPT	18/110 (HB)	

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

PLANT: Bobcat
METHOD: DT to 0.4m, VE to 1.5m, AD to 5.5m, NMLC to 9.6m
REMARKS:

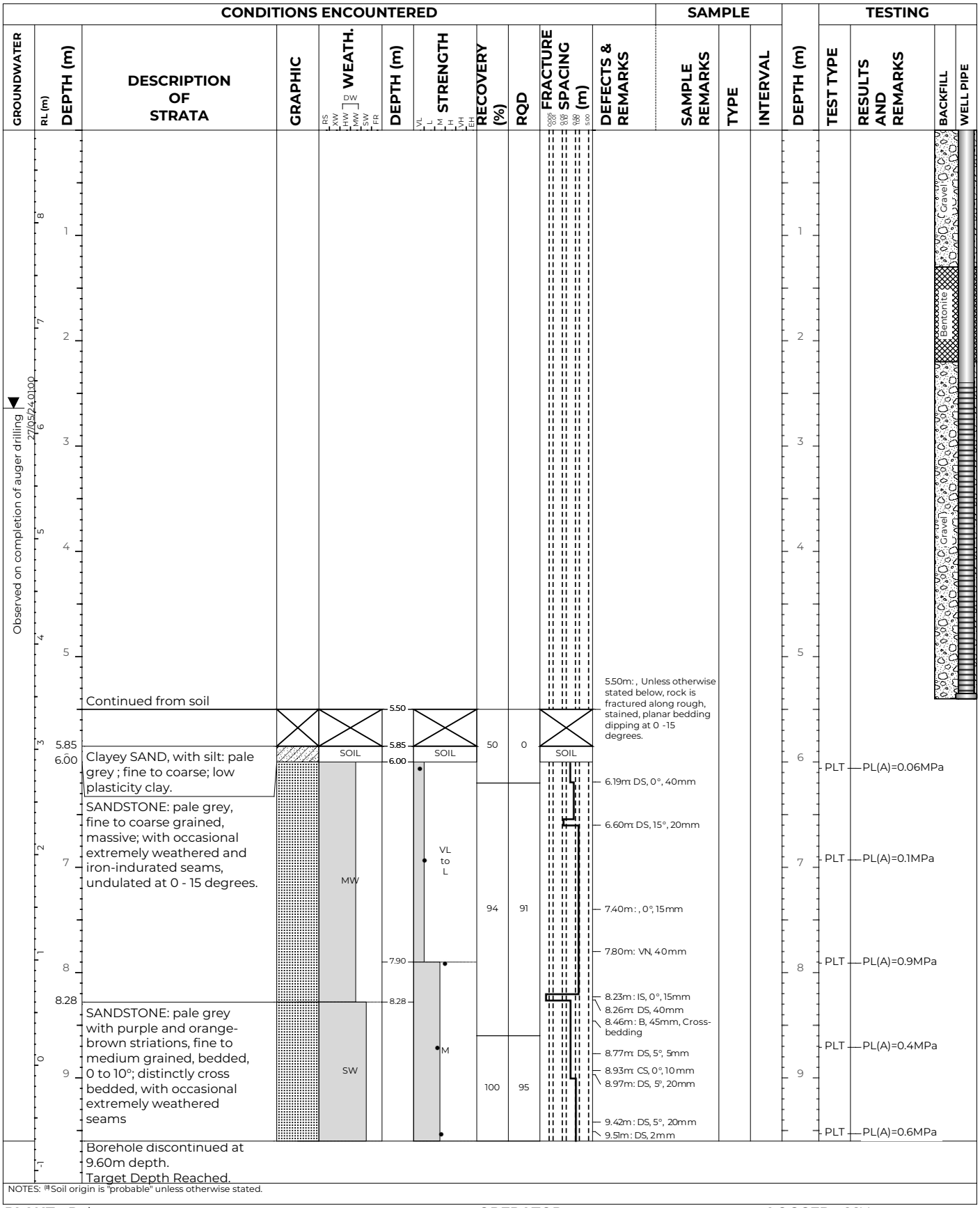
OPERATOR: Ground Test (JJ)
LOGGED: CSY
CASING: HWT to 5.5m

Refer to explanatory notes for symbol and abbreviation definitions

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

BOREHOLE LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21
SURFACE LEVEL: 8.9 AHD
COORDINATE: E:339542.0, N:6262232.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH2
PROJECT No: 71015.54
DATE: 28/05/24 - 29/05/24
SHEET: 2 of 2



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

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

PLANT: Bobcat
OPERATOR: Ground Test (JJ)
LOGGED: CSY
METHOD: DT to 0.4m, VE to 1.5m, AD to 5.5m, NMLC to 9.6m
CASING: HWT to 5.5m
REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: Scentre Design & Construction Pty Ltd
PROJECT: Brookvale Westfield - AVAC Sewer pump station
LOCATION: Warringah Mall, 145 Condamine St, Brookvale, NSW 21

SURFACE LEVEL: 8.9 AHD
COORDINATE: E:339542.0, N:6262232.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH2
PROJECT No: 71015.54
DATE: 28/05/24 - 29/05/24
SHEET: 1 of 1

Douglas Partners
Geotechnics | Environment | Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location	Brookvale Mall AVAC System				Project Number	71015.55
Well Construction Details	Well ID	BH1	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions				Purged By	
Purge Method / Equipment					
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-purge)		m bgl	Observed Well Depth		m bgl
Height of Water Column (H)		m bgl	Estimated Bore Volume*		L
GW Level (post-purge)		m bgl	Total Volume Purged**		L
Appearance/Comments					

Sampling Details					
Date / Time / Weather Conditions	5/6/24 12:53pm Cloudy			Sampled By	
Sampling Method / Equipment					
WQM Model			WQM Calibration Date		
Product observed / Thickness	-	mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	2.52	m bgl	Observed Well Depth	5.48	m bgl
Height of Water Column	2.96	m bgl	Estimated Bore Volume*	-	L
GW Level (post sample)	2.61	m bgl	Total Volume of Micro-Purged	~4	L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
0		21.7	1.13	1157	6.05	-8.0	126.15
1		21.9	0.03	1159	6.05	-47.7	265.97
2		21.9	-0.02	1161	6.07	-66.3	352.81
3		21.9	-0.05	1162	6.09	-85.9	437.05
4		21.9	-0.06	1167	6.12	-104.5	506.08
5		21.9	-0.04	1157	6.15	110.7	869.69
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details							
Sampling Depth (rationale)	4.0-4.5	m bgl,	Between ~~3m~~ water column				
Sample Observations (e.g. colour, sediment, sheen, odour)	Odour						
Sample ID	BH1						
QAQC Samples	Replicate	1	Triplicate		Other		
Sample Containers Quantity / Preservation / Filtration	Amber glass	1	Plastic	1	PFAS (no teflon)	1	
	Metals (F/UF) (HNO3)	2	Phenols/COD/NH3 (H2SO4)	1	Vials (HCl)	1	
	Ferrous/Ferric Iron (HCl)	1	Cyanides/Chromium (NaOH)	1	Other		
Comments							

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

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Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location	Brookvale Mall AVAC System				Project Number	71015.55
Well Construction Details	Well ID	**BH510**	Drilling Method		Hole Diameter (m)~	
	Well Depth (m bgl)		Screened (m bgl)		Stick Up (m)	
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments						

Well Development Details					
Date / Time / Weather Conditions				Purged By	
Purge Method / Equipment					
Product observed / Thickness		mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-purge)		m bgl	Observed Well Depth		m bgl
Height of Water Column (H)		m bgl	Estimated Bore Volume*		L
GW Level (post-purge)		m bgl	Total Volume Purged**		L
Appearance/Comments					

Sampling Details					
Date / Time / Weather Conditions	5/6/24 8:25am Cloudy			Sampled By	JL
Sampling Method / Equipment					
WQM Model			WQM Calibration Date		
Product observed / Thickness	-	mm	Confirmed with Bailer? (Y / N)		
GW Level (pre-micropurge)	3.86	m bgl	Observed Well Depth	5.92	m bgl
Height of Water Column	2.06	m bgl	Estimated Bore Volume*	-	L
GW Level (post sample)	4.08	m bgl	Total Volume of Micro-Purged	~4	L

Water Quality Parameters

Time	Cumulative Volume (L)	Temp (°C)	DO (mg/L)#	EC (µS or mS/cm)	pH	Redox (mV)	Turbidity^
Stabilisation Target (3 readings)		0.2	+/- 10%	+/- 5%	+/- 0.1	+/- 10 mV	+/- 10%
0		20.1	-0.25	513	5.80	-182.6	29.67
1		20.5	-0.30	513	5.83	-192.1	34.48
2		20.5	-0.31	512	5.82	-192.2	28.94
3		20.5	-0.31	512	5.80	-190.3	66.01
4		20.5	-0.32	511	5.75	-187.7	21.28
Notes:	# Considered stabilised if three DO values are less than 0.5 mg/L			^ Considered stabilised if three Turbidity values are less than 5 NTU			

Sample Details						
Sampling Depth (rationale)	4.0-4.5	m bgl,	Between water column			
Sample Observations (e.g. colour, sediment, sheen, odour)	Odour					
Sample ID	BH 510					
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	1	Plastic	1	PFAS (no teflon)	1
	Metals (F/UF) (HNO3)	2	Phenols/COD/NH3 (H2SO4)	1	Vials (HCl)	1
	Ferrous/Ferric Iron (HCl)	1	Cyanides/Chromium (NaOH)	1	Other	
Comments						

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

Appendix E

Site Acceptance Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).
- ANZG *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).
- NHMRC *Guidelines for Managing Risks In Recreational Water* (NHMRC, 2008).
- NHMRC, NRMMC *Australian Drinking Water Guidelines 6 2011, Version 3.2* (NHMRC, NRMMC, 2022).
- ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000).

1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and/or derivation of the SAC:

- Land use: commercial / industrial.
    - Corresponding to land use category 'D', commercial / industrial such as shops, offices, factories and industrial sites.
- Soil type: sand / silt / clay.

2. Soils

2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 1 and Table 2.

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-D
Metals	
Arsenic	3000
Cadmium	900
Chromium (VI)	3600
Copper	240 000
Lead	1500
Mercury (inorganic)	730
Nickel	6000
Zinc	400 000
PAH	
B(a)P TEQ	40
Total PAH	4000
Phenols	
Phenol	240 000
Pentachlorophenol	660
OCP	
DDT+DDE+DDD	3600
Aldrin and dieldrin	45
Chlordane	530
Endosulfan	2000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2500
OPP	
Chlorpyrifos	2000
PCB	
PCB	7
VOC (various analytes)	-

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-D	HSL-D	HSL-D	HSL-D
SAND	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**	**4 m+**
Benzene	3	3	3	3
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	230	NL	NL	NL
Naphthalene	NL	NL	NL	NL
TRH F1	260	370	630	NL
TRH F2	NL	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

Table 3: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-D	DC HSL-IMW
Benzene	430	1100
Toluene	99 000	120 000
Ethylbenzene	27 000	85 000
Xylenes	81 000	130 000
Naphthalene	11 000	29 000
TRH F1	26 000	82 000
TRH F2	20 000	62 000
TRH F3	27 000	85 000
TRH F4	38 000	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
IMW intrusive maintenance worker

2.2 Health investigation levels for per- and poly-fluoroalkyl substances in soil

The laboratory analytical results for per- and poly-fluoroalkyl substances (PFAS) in soil have been assessed against HIL published in HEPA (2020). The HIL represent a nationally-agreed suite that should be used to inform site investigations. The HIL are intentionally conservative, and an exceedance of these criteria may not constitute a risk if other exposure pathways are controlled. An exceedance of the HIL should trigger further investigations, such as a site-specific risk assessment. At the time of this investigation, screening values were available only for perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS).

The HIL derived from Table 2 of HEPA (2020) are in Table 4.

Table 4: Health investigation levels (mg/kg)

Contaminant	HIL-D
PFOS and PFHxS *	20
PFOA	50

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

2.3 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are in Table 5.

Table 5: Health screening levels for asbestos

Form of asbestos	HSL-D
ACM	0.05%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.
* Based on site observations at the sampling points and the analytical results of surface samples.

2.4 Ecological investigation levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 7, with inputs into their derivation shown in Table 6.

Table 6: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	
pH	6.1	Site measured
CEC	10 $cmol_c/kg$	assumed
Clay content	5 %	assumed
Traffic volumes	high	
State / Territory	NSW	

Table 7: Ecological investigation levels (mg/kg)

Contaminant	EIL-D
Metals	
Arsenic	160
Copper	540
Nickel	290
Chromium III	540
Lead	1800
Zinc	750
PAH	
Naphthalene	370
OCP	
DDT	640

Notes: EIL-D – commercial / industrial

2.5 Ecological screening levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 8.

Table 8: Ecological screening levels (mg/kg)

Contaminant	Soil Type	ESL-D
Benzene	Coarse	75
Toluene	Coarse	135
Ethylbenzene	Coarse	165
Xylenes	Coarse	180
TRH F1	Coarse/ Fine	215*

Contaminant	Soil Type	ESL-D
TRH F2	Coarse/ Fine	170*
TRH F3	Coarse	1700
TRH F4	Coarse	3300
B(a)P	Coarse	1.4

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene

2.6 Ecological soil guideline values

The interim ecological soil guideline values (EGV) derived from Table3 of HEPA (2020) are in Table 9.

Table 9: Ecological soil guideline values (mg/kg) – all land uses

Contaminant	Direct exposure	Indirect exposure
PFOS	1	0.01
PFOA	10	NC
PFHxS	NC	NC

Notes: NC no criterion

2.7 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards;
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

The adopted management limits are in Table 10.

Table 10: Management limits (mg/kg)

Contaminant	Soil type	ML-D
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	3500
TRH F4	Coarse	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-A-B-C residential, parkland and public open space

3. Groundwater

3.1 Introduction

The groundwater investigation levels (GIL) used for interpretation of the groundwater data (as a Tier 1 assessment) have been selected based on the potential risks posed from contamination sourced from the site to receptors at or down-gradient of the site, as identified by the conceptual site model (CSM). The receptors, exposure points and pathways are summarised in Table 11.

Table 11: Summary of potential receptors and potential risks

Receptor	Location	Exposure point	Exposure pathway
Surface water aquatic ecosystem	Brookvale Creek within and down-gradient from site.	Receiving surface water body at the groundwater discharge point.	Exposure to contaminants.
Occupants of buildings	On site and down-gradient from site.	Enclosed buildings (retail and commercial).	Inhalation of VOC (including TRH and BTEX) overlying VOC impacted groundwater via the vapour intrusion pathway.
Human recreation (e.g. swimming)	Down-gradient from site.	Receiving surface water body at the groundwater discharge point.	Ingestion / dermal absorption of contaminants during recreational activities (e.g. swimming).
Human consumption	On site and down-gradient from site.	Domestic groundwater bores present in area with unknown use, potentially irrigation or drinking water	Ingestion of contaminants in water used for drinking water supply.
Irrigation	Potential off-site irrigation of golf course with groundwater in the region	Domestic groundwater bores present in area with unknown use, potentially irrigation or drinking water. Potential irrigation bores in Warringah Golf Course	Toxicity to certain agricultural crops via uptake of water.

The rationale for the selection of GIL is in Table 12.

Table 12: Groundwater investigation level rationale

Receptor / beneficial use	GIL	Source	Comments / rationale
Aquatic ecosystem	DGV	ANZG (2018)	Freshwater 99% LOP for bioaccumulative contaminants 95% LOP for non-bioaccumulative contaminants
Aquatic ecosystem	DGV	HEPA (2020)	Freshwater 99% LOP as recommended for potential bioaccumulation

Receptor / beneficial use	GIL	Source	Comments / rationale
			Screening values were only available for PFOS and PFOA at the time of this investigation.
Building occupants (vapour intrusion)	HSL	NEPC (2013)	2 m to <4 m
Recreational waters	GV	NHMRC (2008)	Based on the NHMRC (2022) values x10 (lower limit of recommended 10-20x) to account for ingestion of water whilst undertaking recreational activities. PFAS GV adopted as per NHMRC (2019) guidance note
Drinking water	GV	NHMRC (2022)	Health and aesthetic-based GV
Irrigation	LTV / STV	ANZECC (2000)	Generally applicable to particular crops and should be interpreted with caution in this regard.

Notes: DGV default guideline value
% LOP percentage level of protection of species
HSL health screening level
GV guideline value
LTV long term value (up to 100 years)
STV short term value (up to 20 years)

3.2 Groundwater investigation levels for aquatic ecosystems

The DGV for the protection of aquatic ecosystems derived from ANZG (2018) are in Table 13.

Table 13: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant	Freshwater DGV 95% LOP	Notes
Metals / metalloids		
Arsenic	24 / 13	Levels provided for As III / As IV respectively. Moderate reliability.
Cadmium	0.2	Very high reliability.
Chromium (VI)	1	Chromium VI levels adopted as initial screen for total chromium. Very high reliability.
Copper	1.4	Very high reliability.
Lead	3.4	Moderate reliability.
Mercury (inorganic)	0.06	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Nickel	11	Low reliability.
Zinc	8	Very high reliability.

Contaminant	Freshwater DGV 95% LOP	Notes
BTEX		
Benzene	950	Moderate reliability.
Ethylbenzene	80	Unknown reliability.
m-Xylene	75	Unknown reliability.
o-xylene	350	Low reliability.
p-Xylene	200	Low reliability.
Toluene	180	Unknown reliability.
PAH		
Anthracene	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Benzo(a)pyrene	0.1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Fluoranthene	1	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Naphthalene	16	Low reliability.
Phenanthrene	0.6	99% LOP adopted as recommended due to potential for bioaccumulation. Unknown reliability.
Phenols		
Phenol	320	Moderate reliability.
Pentachlorophenol	3.6	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
2,4,6-Trichlorophenol	3	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
OCP		
Aldrin	0.001	Unknown reliability and LOP.
Chlordane	0.03	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
DDT	0.006	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Dieldrin	0.01	Unknown reliability and LOP.
Endosulfan	0.03	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Endrin	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.

Contaminant	Freshwater DGV 95% LOP	Notes
Heptachlor	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
Methoxychlor	0.005	Unknown reliability and LOP.
OPP		
Chlorpyrifos	0.01	Moderate reliability.
Diazinon	0.01	Moderate reliability.
Dimethoate	0.15	Low reliability.
Fenitrothion	0.2	Moderate reliability.
Malathion	0.05	Moderate reliability.
Parathion	0.004	Moderate reliability.
PCB		
Aroclor 1242	0.3	99% LOP adopted as recommended due to potential for bioaccumulation. Low reliability.
Aroclor 1254	0.01	99% LOP adopted as recommended due to potential for bioaccumulation. Moderate reliability.
VOC		
Tetrachloroethene (PCE)	70	Unknown reliability.
Trichloroethene (TCE)	330	Unknown reliability.
cis-1,2-dichloroethene (DCE)	700	Unknown reliability.
Chloroethene (vinyl chloride / VC)	100	Unknown reliability.
Tetrachloromethane (carbon tetrachloride / CT)	240	Unknown reliability.
Trichloromethane (chloroform / TCM)	370	99% LOP adopted as recommended to protect key species from chronic toxicity. Unknown reliability.

Notes: 95% LOP for non-bioaccumulative contaminants
99% LOP for bioaccumulative contaminants

The DGV for the protection of aquatic ecosystems derived from HEPA (2020) are in Table 14.

Table 14: Groundwater investigation levels for protection of aquatic ecosystems (µg/L)

Contaminant / LOP	Freshwater DGV
PFOS 99% LOP	0.00023
PFOA 99% LOP	19

3.3 Health screening levels for vapour intrusion

The HSL to evaluate potential vapour intrusion risks derived from NEPC (2013) are in Table 15.

Table 15: Groundwater health screening levels for vapour intrusion (µg/L)

Contaminant	HSL-D	Solubility limit
SAND	**2 m to <4 m**	**-**
Benzene	5000	59 000
Toluene	NL	61 000
Ethylbenzene	NL	3900
Xylenes	NL	21 000
Naphthalene	NL	170
TRH F1	6000	9000
TRH F2	NL	3000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.

3.4 Groundwater investigation levels for recreational water

The GV for recreational water derived from NHMRC (2008) are in Table 16.

Table 16: Groundwater investigation levels for protection of recreational waters (µg/L)

Contaminant	Recreational water guideline values
Metals / metalloids	
Arsenic	100
Cadmium	20
Chromium (VI)	500
Copper	20000
Lead	100
Manganese	5000
Mercury (inorganic)	10
Nickel	200
Zinc	30000 (aesthetic only)
BTEX	
Benzene	10

Contaminant	Recreational water guideline values
Ethylbenzene	3000
Xylenes	6000
Toluene	8000
PAH	
Benzo(a)pyrene	0.1
Phenols	
Pentachlorophenol	100
OCP	
Aldrin + Dieldrin	3
Chlordane	20
DDT	90
Endosulfan	200
Heptachlor	3
Methoxychlor	3000
OPP	
Chlorpyrifos	100
Diazinon	40
Dimethoate	70
Fenitrothion	70
Malathion	700
Parathion	200
PFAS	
PFOS + PFHxS*	2
PFOA	10
VOC	
Tetrachloroethene (PCE)	500
cis-1,2-dichloroethene (DCE)	300
Chloroethene (vinyl chloride / VC)	3
Tetrachloromethane (carbon tetrachloride / CT)	30
Trichloromethane (chloroform / TCM)	2500
Physical properties / aesthetics	

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

3.5 Groundwater investigation levels for drinking water

The GV for the drinking water derived from NHMRC, NRMMC (2022) are in Table 17.

Table 17: Groundwater investigation levels for drinking water (µg/L)

Contaminant	Drinking water guideline values
Metals / metalloids	
Arsenic	10
Cadmium	2
Chromium (VI)	50
Copper	2000
Lead	10
Mercury (inorganic)	1
Nickel	20
Zinc	3000 (aesthetic only)
BTEX	
Benzene	1
Ethylbenzene	300
Xylenes	600
Toluene	800
PAH	
Benzo(a)pyrene	0.01
Phenols	
Pentachlorophenol	10
OCP	
Aldrin + Dieldrin	0.3
Chlordane	2
DDT	9
Endosulfan	20
Heptachlor	0.3
Methoxychlor	300
OPP	
Chlorpyrifos	10
Diazinon	4
Dimethoate	7

Contaminant	Drinking water guideline values
Fenitrothion	7
Malathion	70
Parathion	20
PFAS	
PFOS + PFHxS*	0.07
PFOA	0.56
VOC	
Tetrachloroethene (PCE)	50
cis-1,2-dichloroethene (DCE)	30
Chloroethene (vinyl chloride / VC)	0.3
Tetrachloromethane (carbon tetrachloride / CT)	3
Trichloromethane (chloroform / TCM)	250
Iron	300 (aesthetic only)
pH	6.5-8.5 (aesthetic only) <4 and >11 (potential health impacts)
Total dissolved solids	600 mg/L (aesthetic only)

Notes: * Includes PFOS only, PFHxS only and the sum of the two.

3.6 Groundwater investigation levels for irrigation

The GV for irrigation derived from ANZECC (2000) are in Table 18.

Table 18: Groundwater investigation levels for irrigation (µg/L)

Contaminant	Short term irrigation value	Long term irrigation value
Metals / metalloids		
Arsenic	2000	100
Cadmium	50	10
Chromium (VI)	1000	100
Copper	-	200
Iron	5000	200
Lead	5000	2000
Mercury (inorganic)	2	2
Nickel	2000	200
Zinc	5000	2000

Contaminant	Short term irrigation value	Long term irrigation value
Nutrients / pH		
pH	6 - 8.5	6 – 8.5

Notes: Irrigation values are often based on specific crops, sensitive to the contaminant. Refer to guideline for further information.

4. References

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Appendix F

Results Summary Tables

Table F1: Summary of Soil Results

				Priority metals								Priority PAH				Priority TRH						TRH		BTEX							
				Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (B(a)P)	Benzo(a)pyrene TEQ (B(a)P TEQ)	Total PAH	TRH C6 - C10	TRH >C10-C16	PI ((C6-C10)-BTEX)	F2 ((>C10-C16 less Naphthalene))	F3 (>C16-C34)	F4 (>C34-C40)	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane
			PQL	4	0.4	1	1	1	0.1	1	1	1	0.05	0.5	0.05	25	50	25	50	100	100	25	50	0.2	0.5	1	1	1	1	1	1
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL D NEPC 2013				3,000	900	3,600	240,000	1,500	730	6,000	400,000	-	-	40	4,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D (2-4 m) NEPC 2013				-	-	-	-	-	-	-	-	NL	-	-	-	-	-	370	-	-	-	-	-	3	NL	NL	NL	-	-	-	-
HSL D Direct Contact NEPC 2013				-	-	-	-	-	-	-	-	11,000	-	-	-	-	-	26,000	20,000	27,000	38,000	-	-	430	99,000	27,000	81,000	-	-	-	-
HSL D Intrusive Maintenance Worker				-	-	-	-	-	-	-	-	29,000	-	-	-	-	-	82,000	62,000	85,000	1,200,000	-	-	1,100	120,000	85,000	130,000	-	-	-	-
EIL D / ESL D NEPC (2013)				160	-	540	310	1,800	-	290	750	370	1	-	-	-	170	215	-	1,700	3,300	-	-	75	135	165	180	-	-	-	-
HEPA 2020 HILD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 EIL (direct exposure / indirect exposure)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	700	7,000	-	-	3,500	10,000	-	-	-	-	-	-	-	-	-	-
BH01	1.4 - 1.5 m	Sand	29/05/24	<4	<0.4	**19**	**4**	**9**	<0.1	**3**	**12**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH01	1.9 - 2 m	Sand	29/05/24	<4	<0.4	**7**	**5**	**13**	<0.1	**2**	**18**	<1	**0.08**	<0.5	**0.2**	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH01	2.9 - 3 m	Sand	29/05/24	<4	<0.4	**12**	**3**	**16**	<0.1	**4**	**12**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH01	3.4 - 3.5 m	Sand	29/05/24	<4	<0.4	**10**	**3**	**12**	<0.1	**3**	**6**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BD1	0 m	Sand	28/05/24	<4	<0.4	**1**	<1	**1**	<0.1	<1	**1**	<1	-	-	-	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<8	<0.4	**57**	<1	**4**	<0.1	**4**	**5**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH02	1.4 - 1.6 m	Sand	28/05/24	<4	<0.4	**14**	**13**	**16**	<0.1	**9**	**19**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH02	2.3 - 2.5 m	Sand	28/05/24	<4	<0.4	**13**	**2**	**13**	<0.1	**4**	**15**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH02	5.2 - 5.3 m	Sand	28/05/24	<4	<0.4	**2**	**27**	**2**	<0.1	**5**	**19**	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1	<1	<1	<1	<1
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	<4	<0.4	**9**	**5**	**10**	<0.1	**3**	**16**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	6	<0.4	**6**	**6**	**3**	<0.1	**2**	**7**	<1	<0.05	<0.5	<1.55	-	-	<25	<50	<100	<100	<25	<250	<0.2	<0.5	<1	<3	-	-	-	-
757	0.5-0.7	Fill	2/05/2013	<4	<0.4	**20**	**15**	**13**	<0.1	**6**	**17**	<1	0.06	<0.5	0.06	-	-	<25	<50	<100	<100	<25	<250	<0.2	<0.5	<1	<3	-	-	-	-

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance **Red** = EGV-indirect exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level EGV = Environmental Guideline Value ML = Management Limit DC = Direct Contact HSL

Notes:

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

b Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL

c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

SAC based on generic land use thresholds for Commercial/ industrial D

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table F1: Summary of Soil Results

				VOC																																
				1,1-dichloroethane	1,1-Dichloroethene	1,1-dichloropropene	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2,4-trichlorobenzene	1,2,4-trimethyl benzene	1,2-dibromo-3-chloropropane	1,2-dibromoethane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3,5-trimethyl benzene	1,3-dichlorobenzene	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chlorotoluene	4-chlorotoluene	4-isopropyl toluene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	carbon tetrachloride	Monochlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene
			PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL D NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D (2-4 m) NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Intrusive Maintenance Worker				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL D / ESL D NEPC (2013)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 HILD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 EIL (direct exposure / indirect exposure)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	1.4 - 1.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH01	1.9 - 2 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH01	2.9 - 3 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH01	3.4 - 3.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH02	1.4 - 1.6 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH02	2.3 - 2.5 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH02	5.2 - 5.3 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Lab result

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DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table F1: Summary of Soil Results

																				Priority phenol	Priority OCP									
				Cyclohexane	dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	hexachlorobutadiene	Isopropylbenzene (cumene)	n-butyl benzene	n-propylbenzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene	tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	1,1,2-trichloroethylene	Trichlorofluoromethane	Vinyl Chloride	Total Phenolics	DDT+DDE+DDD [c]	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Mirex
			PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL D NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	660	3,600	45	530	2,000	100	50	80	2,500	100
HSL D (2-4 m) NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Intrusive Maintenance Worker				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL D / ESL D NEPC (2013)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	640	-	-	-	-	-	-	-	-	-
HEPA 2020 HILD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 EIL (direct exposure / indirect exposure)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Results																															
Current Investigation																															
BH01	1.4 - 1.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH01	1.9 - 2 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
BH01	2.9 - 3 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
BH01	3.4 - 3.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH02	1.4 - 1.6 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH02	2.3 - 2.5 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
BH02	5.2 - 5.3 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Douglas 2018 Results																															
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<0.3	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

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Notes:

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

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Site Assessment Criteria (SAC):

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Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-D (NEPC, 2013)	ESL	Commercial and Industrial (NEPC, 2013)
DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table F1: Summary of Soil Results

				OCP						Priority OPP	OPP																PCB
				Heptachlor Epoxide	Endrin Aldehyde	alpha-BHC	beta-BHC	delta-BHC	Lindane	Chlorpyriphos	Azinphos methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Bonnel (fenchlorphos)	Fenitrothion	Fenthion	Malathion	Parathion	Parathion-methyl	Methidathion	Fenamiphos	Total PCB
			PQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HIL D NEPC 2013				-	-	-	-	-	-	2,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
HSL D (2-4 m) NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Intrusive Maintenance Worker				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL D / ESL D NEPC (2013)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 HILD				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 EIL (direct exposure / indirect exposure)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	1.4 - 1.5 m	Sand	29/05/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**
BH01	1.9 - 2 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	2.9 - 3 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	3.4 - 3.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH02	1.4 - 1.6 m	Sand	28/05/24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**
BH02	2.3 - 2.5 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	5.2 - 5.3 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.7
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.7

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance **Red** = EGV-indirect exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

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Notes:

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

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SAC based on generic land use thresholds for Commercial/ industrial D

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-D (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
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DC	Direct contact HSL D Commercial/Industrial (CRC CARE, 2011)	ML	Commercial and Industrial (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table F1: Summary of Soil Results

				Priority PFAS					PFAS		Abestos in 40 g Sample		Asbestos (FA/AF)									pH, EC and CEC		Additional PhysChem		
				Total Positive PFAS	PFOA	PFOS + PFHxS	PFOS	PFHxS	6:2 FTS	8:2 FTS	Asbestos ID in soil >0.1g/kg	Trace Analysis (AS)	Asb_Sample_mass	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	Total Asbestos#1	Asbestos Summary	pH 1:5 soil:water	Electrical Conductivity 1:5 soil:water	Moisture	Chloride	Sulphate
			PQL	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002						0.001				0.1	0.1		1	1000	10	10
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	g	g	g	%(w/w)	-	-	-	g/kg		pH Units	µs/cm	mg/kg	mg/kg	mg/kg
HIL D NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D (2-4 m) NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact NEPC 2013				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Intrusive Maintenance Worker				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL D / ESL D NEPC (2013)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 HILD				-	50	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HEPA 2020 EIL (direct exposure / indirect exposure)				-	10 / NC	-	1 / 0.01	NC/ NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	**820.84**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	**6.7**	**58**	**200,000**	<10	**21**
BH01	1.9 - 2 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	**334.65**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	-	-	**190,000**	-	-
BH01	2.9 - 3 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	**474.4**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	-	-	**390,000**	-	-
BH01	3.4 - 3.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	**138.71**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	**6.4**	**81**	**380,000**	**10**	**78**
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**180,000**	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	NAD	NAD	-	-	-	-	-	-	-	-	-	-	-	**180,000**	-	-
BH02	1.4 - 1.6 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	**699.96**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	-	-	**230,000**	-	-
BH02	2.3 - 2.5 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	**562.14**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	-	-	**320,000**	-	-
BH02	5.2 - 5.3 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	**203.8**	-	-	<0.001	NAD	NAD	NAD	<0.1	-	**5.3**	**190**	**160,000**	<10	**320**
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	NAD	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

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		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Douglas PARTNERS

Table F2: Summary of Laboratory Results – Waste Classification

				Metals						TRH		BTEX				PAH		Phenols	OCP				OPP	PCB
				Total Arsenic	Cadmium	Total Chromium	Lead	Mercury (inorganic)	Nickel	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (B(a)P)	Total PAH	Total Phenolics	Scheduled Chemical Waste (standard)	Total Endosulfan	Total Analysed OCP	Mirex	Total Analysed OPP	Total PCB
			PQL	4	0.4	1	1	0.1	1	25	50	0.2	0.5	1	1	0.05	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01	1.4 - 1.5 m	Sand	29/05/24	<4	<0.4	**19**	**9**	<0.1	**3**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
BH01	1.9 - 2 m	Sand	29/05/24	<4	<0.4	**7**	**13**	<0.1	**2**	<25	<50	<0.2	<0.5	<1	<1	0.08	**0.2**	-	-	-	-	-	-	-
BH01	2.9 - 3 m	Sand	29/05/24	<4	<0.4	**12**	**16**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-
BH01	3.4 - 3.5 m	Sand	29/05/24	<4	<0.4	**10**	**12**	<0.1	**3**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-
BD1	0 m	Sand	28/05/24	<4	<0.4	**1**	**1**	<0.1	<1	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<8	<0.4	**57**	**4**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH02	1.4 - 1.6 m	Sand	28/05/24	<4	<0.4	**14**	**16**	<0.1	**9**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**
BH02	2.3 - 2.5 m	Sand	28/05/24	<4	<0.4	**13**	**13**	<0.1	**4**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-
BH02	5.2 - 5.3 m	Sand	28/05/24	<4	<0.4	**2**	**2**	<0.1	**5**	<25	<50	<0.2	<0.5	<1	<1	<0.05	<0.05	-	-	-	-	-	-	-
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	<4	<0.4	**9**	**10**	<0.1	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	**6**	<0.4	**6**	**3**	<0.1	**2**	<25	<250	<0.2	<0.5	<1	<3	<0.05	<1.55	-	-	<0.3	<2	<0.1	-	<0.7
757	0.5-0.7	Fill	2/05/2013	<4	<0.4	**20**	**13**	<0.1	**6**	<25	<250	<0.2	<0.5	<1	<3	0.06	0.06	-	-	<0.3	<2	<0.1	-	<0.7
CT1				100	20	100	100	4	40	650	10,000	10	288	600	1000	0.8	200	288	<50	60	-	-	4	<50
SCC1				500	100	1,900	1,500	50	1,050	650	10,000	18	518	1,080	1,800	10	200	518	<50	108	-	-	7.5	<50
TCLP1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CT2				400	80	400	400	16	160	2,600	40,000	40	1,152	2,400	4,000	3.2	800	1,152	<50	240	-	-	16	<50
SCC2				2,000	400	7,600	6,000	200	4,200	2,600	40,000	72	2,073	4,320	7,200	23	800	2,073	<50	432	-	-	30	<50
TCLP2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPC (1999)				1-50	1	5-1000	2-200	0.03	5-500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992)				0.2-30	0.04-2	0.5-110	<2-200	0.001-0.1	2-400	-	-	0.05 - 1	0.1 - 1	-	-	-	0.95-5	0.03-0.5	-	-	<0.001-<0.97	-	-	0.02-0.1
ANZECC (2000)				1-53	0.016-0.78	2.5-673	2-81		1-517	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

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

b Total chromium used as initial screen for chromium(VI).

c Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)

d Criteria for scheduled chemicals used as an initial screen

e Criteria for Chlorpyrifos used as initial screen

f NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste

PQL Practical quantitation limit

CT1 Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste

SCC1 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

TCLP1 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste

CT2 Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste

SCC2 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

TCLP2 Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Table F2: Summary of Laboratory Results – Waste Classification

				VOC															PFAS				Asbestos in 40 g Sample	
				carbon tetrachloride	Monochlorobenzene	Chloroform	1,2-dichlorobenzene	1,4-dichlorobenzene	1,2-dichloroethane	1,1-Dichloroethene	Styrene (vinylbenzene)	1,1,1,2-tetrachloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1,2-trichloroethylene	Vinyl Chloride	PFOA	TCLP PFOA	PFOS + PFHxS	TCLP PFOS + PFHxS	Asbestos ID in soil >0.1g/kg	Trace Analysis (AS)
			PQL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0001	0.00001	0.0001	0.00001		
Sample ID	Depth		Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/L	-	-
Current Results																								
BH01	1.4 - 1.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH01	1.9 - 2 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH01	2.9 - 3 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH01	3.4 - 3.5 m	Sand	29/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.0001	<0.00001	<0.0001	<0.00001	NAD	NAD
BH02	1.4 - 1.6 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH02	2.3 - 2.5 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH02	5.2 - 5.3 m	Sand	28/05/24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Douglas 2018 Results																								
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD
Waste Classification Criteria [f]																								
CT1				10	2,000	120	86	150	10	14	60	200	26	14	600	24	10	4	-	-	-	-	-	-
SCC1				18	3,600	126	155	270	18	25	108	360	46.8	25.2	1,080	43.2	18	7.2	18	-	1.8	-	-	-
TCLP1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.05	-	-
CT2				40	8,000	480	344	600	40	56	240	800	104	56	2,400	96	40	16	-	-	-	-	-	-
SCC2				72	14,400	864	620	1,080	72	100	432	1,440	187.2	100.8	4,320	172.8	72	28.8	72	-	7.2	-	-	-
TCLP2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	0.2	-	-
Background Ranges for VENM																								
NEPC (1999)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (1992)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ANZECC (2000)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

a	QA/QC replicate of sample listed directly below the primary sample
b	Total chromium used as initial screen for chromium(VI).
c	Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
d	Criteria for scheduled chemicals used as an initial screen
e	Criteria for Chlorpyrifos used as initial screen
f	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
PQL	Practical quantitation limit
CT1	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
SCC1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
TCLP1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
CT2	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
SCC2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
TCLP2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Table F2: Summary of Laboratory Results – Waste Classification

				Asbestos in 500 ml AFFA								
				Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Total Asbestos#1	Asbestos Comment	Asbestos Summary
			PQL						0.001	0.1		0.001
Sample ID	Depth		Sample Date	-	-	-	g	g	%(w/w)	g/kg	-	
BH01	1.4 - 1.5 m	Sand	29/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH01	1.9 - 2 m	Sand	29/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH01	2.9 - 3 m	Sand	29/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH01	3.4 - 3.5 m	Sand	29/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BD1	0 m	Sand	28/05/24	-	-	-	-	-	-	-	-	-
BH02	0.35 - 0.5 m	Fill	28/05/24	-	-	-	-	-	-	-	Nil	-
BH02	1.4 - 1.6 m	Sand	28/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH02	2.3 - 2.5 m	Sand	28/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH02	5.2 - 5.3 m	Sand	28/05/24	NAD	NAD	NAD	–	–	<0.001	<0.1	Nil	-
BH01 - [TRIPLICATE]	1.4 - 1.5 m	Sand	29/05/24	-	-	-	-	-	-	-	-	-
755	0.9-1	Fill	2/05/2013	-	-	-	-	-	-	-	-	-
757	0.5-0.7	Fill	2/05/2013	-	-	-	-	-	-	-	-	-
CT1				-	-	-	-	-	-	-	-	-
SCC1				-	-	-	-	-	-	-	-	-
TCLP1				-	-	-	-	-	-	-	-	-
CT2				-	-	-	-	-	-	-	-	-
SCC2				-	-	-	-	-	-	-	-	-
TCLP2				-	-	-	-	-	-	-	-	-

NEPC (1999)				-	-	-	-	-	-	-	-	-
ANZECC (1992)				-	-	-	-	-	-	-	-	-
ANZECC (2000)				-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

a	QA/QC replicate of sample listed directly below the primary sample
b	Total chromium used as initial screen for chromium(VI).
c	Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
d	Criteria for scheduled chemicals used as an initial screen
e	Criteria for Chlorpyrifos used as initial screen
f	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
PQL	Practical quantitation limit
CT1	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
SCC1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
TCLP1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
CT2	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
SCC2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
TCLP2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Acid Sulfate Soil Test Results v1.2

Table F3: Summary of results - acid sulfate soils

Project No:

Project Name:

Location:

Sample Information						Screening Test Results				Laboratory Analysis Results (Acid Base Accounting)								
Location ID	Depth from (m)	Depth to (m)	Reduced level (AHD)	Sample Description	Adopted Texture	pH_F (pH units)	pH_{FOX} (pH units)	Reaction Strength	pH change (pH units)	pH_{KCl} (pH units)	S_{KCl} (%S)	S_{HCl} (%S)	Scr (%S)	TAA (%S)	S_{NAS} (%S)	ANC_{BT} (%S)	ANC Corroborated (Y/N)	Net Acidity (%S)
				Assessment Criteria (pH units)		**<4**	**<3**	-	**1.0**	Action Criteria (%S)		Coarse texture: sands to loamy sands and peats						0.03
BH01	1.40	1.50	7.70 to 7.60	Clayey sand	C	5.9	**2.1**	Medium reaction	**3.8**	5.1	NT	NT	0.009	0.030	NT	NT	N	0.041
BH01	1.90	2.00	7.20 to 7.10	Clayey sand	C	6.8	**2.1**	Medium reaction	**4.7**	-	-	-	-	-	-	-	N	-
BH01	2.40	**2.50**	6.70 to 6.60	Peaty sand	C	6.7	**2.3**	Medium reaction	**4.4**	4.6	NT	NT	0.010	0.050	NT	NT	N	0.066
BH01	**2.50**	**2.95**	6.60 to 6.15	Peaty sand	C	6.7	**2.2**	Medium reaction	**4.5**	4.7	NT	NT	0.030	0..05	NT	NT	N	0.084
BH01	**2.80**	**3.00**	6.30 to 6.10	Peaty sand	C	6.6	3.0	Medium reaction	**3.6**	-	-	-	-	-	-	-	N	-
BH01	**3.40**	**3.50**	5.70 to 5.60	Peaty sand	C	7.0	**2.5**	Medium reaction	**4.5**	5.6	NT	NT	0.040	<0.01	NT	NT	N	0.050
BH01	**3.90**	**4.00**	5.20 to 5.10	Peaty sand	C	7.0	**2.8**	Medium reaction	**4.2**	-	-	-	-	-	-	-	N	-
BH01	**4.00**	**4.45**	5.10 to 4.65	Peaty sand	C	6.9	**2.7**	Medium reaction	**4.2**	5.8	NT	NT	<0.005	<0.01	NT	NT	N	<0.005
BH02	**4.30**	**4.60**	4.60 to 4.30	Clay with peat	C	7.6	**2.6**	Medium reaction	**5.0**	-	-	-	-	-	-	-	N	-
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Notes:

Adopted texutre - C = coarse, M = medium, F = fine

pH_F - Soil pH in water

pH_{FOX} - Soil pH in peroxide

Reaction strength: L - Low , M - Medium, H - High, X - Extreme, V - Volcanic, F - Frothing (indicative of organic material)

pH change = pH_F - pH_{FOX}

pH_{KCL} - KCl extractable pH

S_{KCl} - KCl extractable sulfur

S_{HCl} - HCl extractable sulfur

S_{cr} - potential sulfidic acidity

TAA - titratable actual acidity (reported if pH_{KCL}<6.5)

S_{NAS} – retained acidity (reported if pHkCl < 4.5)

ANC_{BT} – acid neutralising capacity (reported if pH_{KCl} ≥ 6.5)

NT - Not tested

Blue depths indicate where samples have been collected at or below the groundwater table

Bold results are indicators of ASS conditions, noting:

- Assessment criteria are considered a reasonable initial screening for AASS or PASS
- pH_F<4 is indicative of the presence of Actual ASS (AASS), although it is not conclusive of ASS on its own as naturally occurring non ASS soils can have pH_F<5
- pH_{FOX}<3 or pH Change ≥1 may indicate potential ASS (PASS), although exception apply. Laboratory testing required to confirm presence of Reduced Inorganic Sulfur (RIS)
- Refer to Table 5.1, A2, A3 of Sullivan,L. et al (2018) for further details

Shaded results trigger action (i.e. equal to or exceed the action criteria). Criteria is specific for soil texture and anticpated tonnage of soil disturbed.

Net Acidity can only include the measured ANC where the ANC has been corroborated by other data (for example slab incubation data) that demonstrates the soil material does not experience acidification during complete oxidation under field conditions.

a - Action criterion for disturbance of 1-1000 tonnes of material

b - Action criterion for disturbance of more than 1000 tonnes of material

The action criteria apply only to ASS materials and not to other acidic soils such as acidic peatlands and coastal heaths.

Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

		Metals	Metals - Dissolved									TRH				BTEX											
		Iron (total)	Total Arsenic	Cadmium	Total Chromium	Copper	Iron	Lead	Mercury (inorganic)	Nickel	Zinc	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Naphthalene	Benzo(a)pyrene (BaP)
	PQL	10	1	0.1	1	1	10	1	0.05	1	1	10	50	100	100	1	1	1	1	2	1	0.1	0.1	0.1	0.1	1	0.1
NHMRC (2018) ADWG Health		300	10	2		2,000		10	1	20						1	800	300			600						0.01
NHMRC (2012) Recreation			100	20		20,000		100	10	200						10	8,000	3,000			6,000						0.1
NEPC (2013) HSL 2-4m												6,000	NL			5,000	NL	NL			NL					NL	
ANZG (2018) 95% LOP Fresh			13	0.2	1	1.4		3.4	**0.06**	11	8					950	180	80	350	75				**0.01**		16	**0.1**
HEPA (2020) 99% LOP Fresh																											
ANZECC (2000) Irrigation Long Term Trigger Va		200	100	10	100	200	200	2,000	2	200	2,000																
ANZECC (2000) Irrigation Short Term Trigger Va		10,000	2,000	50	1000	5,000	10,000	5,000	2	2,000	5,000																
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	**24,000**	<1	<0.1	<1	<1	**16,000**	<1	<0.05	<1	**5**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1
BD1/20240506	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<2	<1	-	-	-	-	-	-
BH510	05/06/24	-	<1	<0.1	<1	<1	-	<1	<0.05	<1	**2**	<10	<50	<100	<100	<1	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<1	<0.1

Notes:

- No criterion / not defined / not tested / not applicable
* QA/QC replicate of sample listed directly below the primary sample
NL Not limiting
PQL Practical quantitation limit
Shaded cell is exceedance of guideline value
Where one or more guideline value is exceeded, the cell is shaded to the colour of the highest guideline value exceeded
NEPC (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), health screening level Sand 2-4m
ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 95% level of protection of species for Fresh aquatic ecosystems [NB: 99% level of protection adopted for bioaccumulative chemicals]
HEPA (2018) PFAS National Environmental Management Plan, Version 2 99% level of protection for Fresh water aquatic ecosystems
NHMRC (2018) Australian Drinking Water Guidelines 6 2011, drinking water aesthetic-based criteria
NHMRC (2008) Guidelines for Managing Risk in Recreational Water
ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, irrigation water Short Term Trigger Values
ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, irrigation water Long Term Trigger Values
ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, orange text is 'unknown' level of protection
Underlining of ANZG (2018) criteria indicates a criteria with an 'unknown' level of protection.
ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic
ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered
ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

		PAH										OCP																
		Benzo(b,j+k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Phenanthrene	Pyrene	Sum of detected PAH	DDE	DDT	DDD	Aldrin	Dieldrin	Aldrin + Dieldrin (calculated)	alpha-chlordane	gamma-Chlordane	Endosulfan I	Endosulfan II	Endosulfan Sulphate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Methoxychlor
	PQL	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
NHMRC (2018) ADWG Health													9				0.3								0.3			
NHMRC (2012) Recreation													90				3								3			
NEPC (2013) HSL 2-4m																												
ANZG (2018) 95% LOP Fresh					**1**			**0.6**					**0.006**		**0.001**	**0.01**							**0.01**		**0.01**		0.1	**0.005**
HEPA (2020) 99% LOP Fresh																												
ANZECC (2000) Irrigation Long Term Trigger Va																												
ANZECC (2000) Irrigation Short Term Trigger Va																												
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BD1/20240506	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH510	05/06/24	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

- No criterion / not defined / not tested / not applicable
- * QA/QC replicate of sample listed directly below the primary sample
- NL Not limiting
- PQL Practical quantitation limit

Shaded cell is exceedance of guideline value

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

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

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

HEPA (2018) PFAS National Environmental Management Plan, Version 2 99% level of protection for Fresh water aquatic ecosystems

NHMRC (2018) Australian Drinking Water Guidelines 6 2011, drinking water aesthetic-based criteria

NHMRC (2008) Guidelines for Managing Risk in Recreational Water

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, irrigation water Short Term Trigger Values

ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality, irrigation water Long Term Trigger Values

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

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

ANZG (2018) DGV adopted for most conservative species of following analytes: DGV for xylene (m) adopted for xylene (m+p); DGV for CrVI adopted for total chromium; DGV for AsV adopted for total arsenic

ANZG (2018) DGV adopted for aluminium in freshwater is for receiving waters with pH >6.5. For receiving waters with pH <6.5 suitability of the more conservative, low reliability DGV of unknown LOP should be considered

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

Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

							OPP																PCB				
		alpha-BHC	beta-BHC	delta-BHC	Lindane	Sum of detected OCP	Azinphos methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Ronnel (fenchlorphos)	Fenitrothion	Fenthion	Malathion	Parathion	Parathion-methyl	Methidathion	Fenamiphos	Sum of detected OPP	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248
	PQL	0.001	0.001	0.001	0.001	0.001	0.02	0.05	0.009	0.05	0.01	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.004	0.05	0.05	0.05	0.004	0.01	0.01	0.01	0.01	0.01
NHMRC (2018) ADWG Health					10		30	10	10		4	5	7	4		7	7	70	20	0.7	6	0.5						
NHMRC (2012) Recreation					100		300	100	100		40	50	70	40		70	70	700	200	7	60	5						
NEPC (2013) HSL 2-4m																												
ANZG (2018) 95% LOP Fresh					0.2		0.02		**0.00004**		0.01		0.15			0.2		0.05	0.004								**0.3**	
HEPA (2020) 99% LOP Fresh																												
ANZECC (2000) Irrigation Long Term Trigger Va																												
ANZECC (2000) Irrigation Short Term Trigger Va																												
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	<0.001	<0.001	<0.001	<0.001	<0.001	<0.02	<0.05	<0.009	<0.05	<0.01	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.004	<0.05	<0.05	<0.05	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01
BD1/20240506	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH510	05/06/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

- No criterion / not defined / not tested / not applicable
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NL Not limiting
PQL Practical quantitation limit
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HEPA (2018) PFAS National Environmental Management Plan, Version 2 99% level of protection for Fresh water aquatic ecosystems
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ANZG (2018) Ammonia DGV is pH and temperature dependant. DGV for a pH of 8 provided in table.

Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

		Aroclor 1254	Aroclor 1260	Sum of detected PCB	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene	1,1,2-trichloroethane	1,1,2-trichloroethylene	1,1-dichloroethane	1,1-Dichloroethene	1,1-dichloropropene	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2,4-trichlorobenzene	1,2,4-trimethyl benzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3,5-trimethyl benzene	1,3-dichlorobenzene	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chlorotoluene	4-chlorotoluene
	PQL	0.01	0.01	0.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NHMRC (2018) ADWG Health								50				30							1,500	3					40			
NHMRC (2012) Recreation								500				300							15,000	30					400			
NEPC (2013) HSL 2-4m																												
ANZG (2018) 95% LOP Fresh		**0.01**				270	400	70	6,500	330		700		**3**		**85**			160	1,900	900		260	1,100	60			
HEPA (2020) 99% LOP Fresh																												
ANZECC (2000) Irrigation Long Term Trigger Va																												
ANZECC (2000) Irrigation Short Term Trigger Va																												
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	<0.01	<0.01	<0.01	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BD1/20240506	05/06/24	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BH510	05/06/24	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:

- No criterion / not defined / not tested / not applicable
* QA/QC replicate of sample listed directly below the primary sample
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Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

		VOC (excluding BTEX)																								
		4-isopropyl toluene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	carbon tetrachloride	Chloroethane	Vinyl Chloride	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Isopropylbenzene (cumene)	Cyclohexane	dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	1,2-dibromoethane	hexachlorobutadiene	Bromomethane	Monochlorobenzene	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene
	PQL	1	1	1	1	1	1	10	10	1	10	1	1	1	1	1	1	10	1	1	10	1	1	1	1	1	1
NHMRC (2018) ADWG Health							3		0.3										1	0.7	1	300				30	
NHMRC (2012) Recreation							30		3										10	7	10	3,000				300	
NEPC (2013) HSL 2-4m																											
ANZG (2018) 95% LOP Fresh							240		100	770				30								55					
HEPA (2020) 99% LOP Fresh																											
ANZECC (2000) Irrigation Long Term Trigger Va																											
ANZECC (2000) Irrigation Short Term Trigger Va																											
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	<1	<1	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1
BD1/20240506	05/06/24	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	<1	<1	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1
BH510	05/06/24	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	<1	<1	<1	<1	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1

Notes:

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Table 4 : Summary of Laboratory Results – Metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC (excluding BTEX), PFAS, Physical Parameters

						PFAS						Physical Parameters	
		trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichlorofluoromethane	Sum of detected VOC	PFOS	PFOA	PFHxS	6:2 FTS	8:2 FTS	Sum of detected PFAS	Total Suspened Solids	Total dissolved solids
	PQL	1	1	10	1	0.001	0.001	0.001	0.001	0.002	0.001		5,000
NHMRC (2018) ADWG Health						0.07	0.56	0.07				600,000	
NHMRC (2012) Recreation							10						
NEPC (2013) HSL 2-4m													
ANZG (2018) 95% LOP Fresh													
HEPA (2020) 99% LOP Fresh						**0.00023**	**19**						
ANZECC (2000) Irrigation Long Term Trigger Va													
ANZECC (2000) Irrigation Short Term Trigger Va													
Sample ID	Sample Date	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BH2	05/06/24	<1	<1	<10	<1	**0.008**	**0.016**	**0.004**	<0.001	<0.002	**0.028**	**110,000**	**530,000**
BD1/20240506	05/06/24	<1	<1	<10	<1	-	-	-	-	-	-	-	-
BH510	05/06/24	<1	<1	<10	<1	-	-	-	-	-	-	-	-

Notes:

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

Appendix G

Fieldwork Methodology

1. Guidelines

The following key guidelines were consulted for the field work methodology:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

2. Soil sampling

Soil sampling was carried out in accordance with Douglas' standard operating procedures. The general sampling and sample management procedures comprised:

- Collection of soil samples directly from t at the nominated sample depth from the SPT sample tube / solid flight auger;
- Transfer of samples in laboratory-prepared glass jars with Teflon lined lids by hand, capping immediately and minimising headspace within the sample jar;
- Transfer of samples in laboratory-prepared container (specific for PFAS) by hand, capping immediately and minimising headspace within the sample jar;
- Collection of replicate samples in zip-lock bags for photoionisation detector (PID) screening;
- Collection of ~500 ml samples for fibrous asbestos and asbestos fines (FA and AF) analysis;
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Collect 10% replicate samples for quality control (QC) purposes;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Place samples into a cooled, insulated and sealed container for transport to the laboratory;
- Collection of soil samples for acid sulfate soils analysis at every 0.5 m depth interval or at least one sample for every change in strata observed. Samples were Placed immediately into zip-lock plastic bags after minimising air content and potential for moisture loss and immediately place on ice in a cooled, insulated and sealed container for transport to the laboratory. Once in the laboratory place the samples in a freezer; and
- Use chain of custody documentation.

Reference was made to HEPA (2020) for requirements specific to PFAS.

2.1 Field testing

Field testing is carried out in accordance with Douglas' standard operating procedures. The general sampling and sample management procedures comprise:

PID field test

- Calibrate the PID with isobutylene gas at 100 ppm and with fresh air prior to commencement of each successive day's field work;
- Allow the headspace in the PID zip-lock bag samples to equilibrate; and
- Screen using the PID.

3. Groundwater sampling

3.1 Monitoring well installation

Monitoring wells are constructed using class 18 uPVC machine slotted screen and blank sections with screw threaded joints. The screened section of each well is backfilled with a washed sand filter pack to approximately 0.5 m above the screened interval. Each well is completed with a hydrated bentonite plug of at least 0.5 m thick and then bentonite to the surface, finished as a with s cast iron road-box.

3.2 Monitoring well development

Groundwater monitoring wells are developed as soon as practicable following well installation. The purpose of well development is to remove sediments and/or drilling fluid introduced to the well during drilling and to facilitate connection of the monitoring well to the aquifer. The wells are developed by pumping / bailing to remove a minimum of five well volumes, or until dry.

3.3 Groundwater sampling

Groundwater sampling was carried out in accordance with Douglas' standard operating procedures. Groundwater samples are collected using a low flow peristaltic pump via the micro-purge (minimal drawdown) method. The sampling method is described as follows:

- Measurement of the static water level using an electronic interface probe and record the thickness of any LNAPL (if encountered);
- Decontamination of the interface probe and cable between monitoring wells by rinsing in a diluted Decon-90 / Liquinox solution and then rinsing in demineralised water;
- Lowering of the the well-dedicated tubing into the well then clamped at a level estimated to be 1 m below the top of the water column (provided the depth of the pump is within the screened section) or to the approximate mid-point of the well screen;
- The pump was set at the lowest rate possible to minimise drawdown of the water column;
- Physical parameters were measured by continuously passing the purged water through a flow cell; and
- Following stabilisation of the field parameters, samples were collected in laboratory-prepared bottles minimising headspace within the sample bottle and cap immediately.

Sample handling, all methods

The general groundwater sample handling and management procedures comprise:

- Collection of 10% replicate samples for QC purposes;
- Labelling of sample containers with individual and unique identification details, including project number and sample location;
- Placement of the sample jars into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

4. References

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP).* Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

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

Appendix H

Laboratory Certificates

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 352938

Client Details

Client	Douglas Partners Pty Ltd
Attention	James Connaughton
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**71015.54, Brookvale**
Number of Samples	9 Soil
Date samples received	03/06/2024
Date completed instructions received	03/06/2024

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	11/06/2024
Date of Issue	07/06/2024

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

Results Approved By
Jenny He, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

sPOCAS field test						
Our Reference		352938-1	352938-2	352938-3	352938-4	352938-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH01
Depth		1.4-1.5	1.9-2	2.4-2.5	2.5-2.95	2.8-3
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024	03/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
pH_F (field pH test)	pH Units	5.9	6.8	6.7	6.7	6.6
pH_{FOX} (field peroxide test)	pH Units	2.1	2.1	2.3	2.2	3.0
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test					
Our Reference		352938-6	352938-7	352938-8	352938-9
Your Reference	UNITS	BH01	BH01	BH01	BH02
Depth		3.4-3.5	3.9-4	4-4.45	4.3-4.6
Date Sampled		28/05/2024	28/05/2024	28/05/2024	27/05/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024
pH_F (field pH test)	pH Units	7.0	7.0	6.9	7.6
pH_{FOX} (field peroxide test)	pH Units	2.5	2.8	2.7	2.6
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction

Method ID	Methodology Summary
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.

QUALITY CONTROL: sPOCAS field test						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/06/2024	[NT]	[NT]	[NT]	[NT]	03/06/2024	[NT]
Date analysed	-			04/06/2024	[NT]	[NT]	[NT]	[NT]	04/06/2024	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	71015.54	**Suburb:**	Brookvale	**To:**	Envirolab Services
Project Manager:	James Connaughton	**Order Number:**		**Sampler:** CSY	12 Ashley St, Chatswood NSW 2067
Email:	James.connaughton@douglaspartners.com.au, Kurt.plambeck@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.cor
Prior Storage	☐ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☐ No ☐ Yes (If YES, handle, transport, store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: ASS Screening											Notes/ Preservation/ Additional Requirements
1	BH01	1.4	1.5	28/05/24	S		X											
2	BH01	1.9	2	28/05/24	S		X											
3	BH01	2.4	2.5	28/05/24	S		X											
4	BH01	2.5	2.95	28/05/24	S		X											
5	BH01	2.8	3	28/05/24	S		X											
6	BH01	3.4	3.5	28/05/24	S		X											
7	BH01	3.9	4	28/05/24	S		X											
8	BH01	4	4.45	28/05/24	S		X											
9	BH02	4.3	4.6	27/05/24	S		X											

ENVIROLAB

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

Job No: 352938

Date Received: 3/6/24

Time Received: 1340

Received By: KW

Temp: Cool/Ambient

Cooling: Ice/Icepack 2°C

Security: Intact/Broken/None

Metals to analyse:

Number of samples in container:

Transported to laboratory by:

Send results to: Douglas Partners Pty Ltd

Address: 96 Hermitage Road, West Ryde NSW 2114 **Phone:** (02) 9809 0666

Relinquished by: KDP **Date:** 3/06/2024 **Signed:**

LAB RECEIPT

Lab Ref. No: 352938

Received by: Katy Wayne

Date & Time: 3/6/24 1340

Signed:

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	James Connaughton

Sample Login Details

Your reference	71015.54, Brookvale
Envirolab Reference	352938
Date Sample Received	03/06/2024
Date Instructions Received	03/06/2024
Date Results Expected to be Reported	11/06/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	9 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	2
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Sample received labelled BH02/1.4-1.6 - assumed as BH02/4.3-4.6 (#9)

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	sPOCAS field test
BH01-1.4-1.5	✓
BH01-1.9-2	✓
BH01-2.4-2.5	✓
BH01-2.5-2.95	✓
BH01-2.8-3	✓
BH01-3.4-3.5	✓
BH01-3.9-4	✓
BH01-4-4.45	✓
BH02-4.3-4.6	✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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CERTIFICATE OF ANALYSIS 352938-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**71015.54, Brookvale**
Number of Samples	Additional CrS analysis
Date samples received	03/06/2024
Date completed instructions received	11/06/2024

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	18/06/2024
Date of Issue	18/06/2024

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

Results Approved By
Jenny He, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

Chromium Suite						
Our Reference		352938-A-1	352938-A-3	352938-A-4	352938-A-6	352938-A-8
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH01
Depth		1.4-1.5	2.4-2.5	2.5-2.95	3.4-3.5	4-4.45
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/06/2024	03/06/2024	03/06/2024	03/06/2024	03/06/2024
Date analysed	-	12/06/2024	12/06/2024	12/06/2024	12/06/2024	12/06/2024
pH $_{kcl}$	pH units	5.1	4.6	4.7	5.6	5.8
s-TAA pH 6.5	%w/w S	0.03	0.05	0.05	<0.01	<0.01
TAA pH 6.5	moles H^+ /t	20	32	32	<5	<5
Chromium Reducible Sulfur	%w/w	0.009	0.01	0.03	0.04	<0.005
a-Chromium Reducible Sulfur	moles H^+ /t	6	9	21	27	<3
S_{HCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_{BT}	% $CaCO_3$	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_{BT}	%w/w S	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.041	0.066	0.084	0.050	<0.005
a-Net Acidity	moles H^+ /t	26	41	52	31	<5
Liming rate	kg $CaCO_3$ /t	2	3	4	2	<0.75
a-Net Acidity without ANCE	moles H^+ /t	26	41	52	31	<5
Liming rate without ANCE	kg $CaCO_3$ /t	1.9	3.1	3.9	2.4	<0.75
s-Net Acidity without ANCE	%w/w S	0.041	0.066	0.084	0.050	<0.005

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2

QUALITY CONTROL: Chromium Suite						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/06/2024	1	03/06/2024	03/06/2024		03/06/2024	[NT]
Date analysed	-			12/06/2024	1	12/06/2024	12/06/2024		12/06/2024	[NT]
pH $_{kcl}$	pH units		Inorg-068	[NT]	1	5.1	5.1	0	95	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	1	0.03	0.03	0	[NT]	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-068	<5	1	20	21	5	94	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	1	0.009	0.008	12	97	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	1	6	5	18	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-068	<0.005	1	[NT]	[NT]		[NT]	[NT]
ANC_{BT}	% $CaCO_3$	0.05	Inorg-068	<0.05	1	[NT]	[NT]		[NT]	[NT]
s-ANC_{BT}	%w/w S	0.05	Inorg-068	<0.05	1	[NT]	[NT]		[NT]	[NT]
s-Net Acidity	%w/w S	0.005	Inorg-068	<0.005	1	0.041	0.042	2	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-068	<5	1	26	26	0	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	1	2	2	0	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-068	<5	1	26	26	0	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	1	1.9	2.0	5	[NT]	[NT]
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	<0.005	1	0.041	0.042	2	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Anna Bui

From: Kurt Plambeck <kurt.plambeck@douglaspartners.com.au>
Sent: Tuesday, 11 June 2024 4:49 PM
To: Stuart Chen
Cc: Samplereceipt
Subject: RE: Results for Registration 352938 71015.54, Brookvale

Hi Stuart,

Can you please run the following samples for the chromium reducible sulphur suite

BH01 depths
1 1.4-1.5 m,
3 2.4-2.5 m
4 2.5-2.95,
6 3.4-3.5 and
8 4-4.45

Kurt Plambeck | Senior Associate/Environmental Scientist

02 9809 0666 +61 402 057 147 kurt.plambeck@douglaspartners.com.au

www.douglaspartners.com.au 96 Hermitage Road, West Ryde
NSW 2114 | Wallumedegal Country
PO Box 472, West Ryde, NSW 1685

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From: Stuart Chen <SChen2@envirolab.com.au>
Sent: Friday, June 7, 2024 5:41 PM
To: James Connaughton <james.connaughton@douglaspartners.com.au>; Kurt Plambeck <kurt.plambeck@douglaspartners.com.au>
Subject: Results for Registration 352938 71015.54, Brookvale

ELS REF: 352938-A
TAT: STANDARD
DUE: 18/6/24
AB.

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC/paperwork received from you
ESDAT Extracts
an Excel or .csv file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
customerservice@envirolab.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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck

Sample Login Details

Your reference	71015.54, Brookvale
Envirolab Reference	352938-A
Date Sample Received	03/06/2024
Date Instructions Received	11/06/2024
Date Results Expected to be Reported	18/06/2024

Sample Condition

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

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	Chromium Suite	On Hold
BH01-1.4-1.5	✓	
BH01-1.9-2		✓
BH01-2.4-2.5	✓	
BH01-2.5-2.95	✓	
BH01-2.8-3		✓
BH01-3.4-3.5	✓	
BH01-3.9-4		✓
BH01-4-4.45	✓	
BH02-4.3-4.6		✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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CERTIFICATE OF ANALYSIS 353314

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**71015.55 Brookvale**
Number of Samples	6 Water
Date samples received	06/06/2024
Date completed instructions received	06/06/2024

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	14/06/2024
Date of Issue	14/06/2024

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Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Loren Bardwell, Development Chemist
Nancy Zhang, Laboratory Manager, Sydney
Sean McAlary, Chemist (FAS)

Authorised By
Nancy Zhang, Laboratory Manager

VOCs in water					
Our Reference		353314-1	353314-2	353314-3	353314-6
Your Reference	UNITS	BH1	BH510	BD1/20240506	Rinsate
Date Sampled		05/06/2024	05/06/2024	05/06/2024	05/06/2024
Type of sample		Water	Water	Water	Water
Date Extracted	-	07/06/2024	07/06/2024	07/06/2024	07/06/2024
Date Analysed	-	11/06/2024	11/06/2024	11/06/2024	11/06/2024
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1
Chloroform	µg/L	<1	<1	<1	<1
2,2-dichloropropane	µg/L	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1
Benzene	µg/L	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1

VOCs in water					
Our Reference		353314-1	353314-2	353314-3	353314-6
Your Reference	UNITS	BH1	BH510	BD1/20240506	Rinsate
Date Sampled		05/06/2024	05/06/2024	05/06/2024	05/06/2024
Type of sample		Water	Water	Water	Water
Bromoform	µg/L	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2
Styrene	µg/L	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1
o-xylene	µg/L	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1
Isopropylbenzene	µg/L	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	114	115	113	113
Surrogate Toluene-d8	%	99	98	99	99
Surrogate 4-Bromofluorobenzene	%	95	97	97	97

vTRH(C6-C10)/BTEXN in Water					
Our Reference	UNITS	353314-1	353314-2	353314-4	353314-5
Your Reference		BH1	BH510	TS	TB
Date Sampled		05/06/2024	05/06/2024	05/06/2024	05/06/2024
Type of sample		Water	Water	Water	Water
Date extracted	-	07/06/2024	07/06/2024	07/06/2024	07/06/2024
Date analysed	-	11/06/2024	11/06/2024	11/06/2024	11/06/2024
TRH C_6 - C_9	µg/L	<10	<10	[NA]	<10
TRH C_6 - C_{10}	µg/L	<10	<10	[NA]	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	[NA]	<10
Benzene	µg/L	<1	<1	99%	<1
Toluene	µg/L	<1	<1	99%	<1
Ethylbenzene	µg/L	<1	<1	100%	<1
m+p-xylene	µg/L	<2	<2	99%	<2
o-xylene	µg/L	<1	<1	100%	<1
Naphthalene	µg/L	<1	<1	[NA]	<1
Surrogate Dibromofluoromethane	%	114	115	114	114
Surrogate Toluene-d8	%	99	98	99	100
Surrogate 4-Bromofluorobenzene	%	95	97	99	96

svTRH (C10-C40) in Water			
Our Reference		353314-1	353314-2
Your Reference	UNITS	BH1	BH510
Date Sampled		05/06/2024	05/06/2024
Type of sample		Water	Water
Date extracted	-	07/06/2024	07/06/2024
Date analysed	-	08/06/2024	08/06/2024
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	<50
Surrogate o-Terphenyl	%	62	96

PAHs in Water			
Our Reference		353314-1	353314-2
Your Reference	UNITS	BH1	BH510
Date Sampled		05/06/2024	05/06/2024
Type of sample		Water	Water
Date extracted	-	11/06/2024	11/06/2024
Date analysed	-	13/06/2024	12/06/2024
Naphthalene	µg/L	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	80	112

OCPs in Water - Trace Level		
Our Reference		353314-1
Your Reference	UNITS	BH1
Date Sampled		05/06/2024
Type of sample		Water
Date extracted	-	11/06/2024
Date analysed	-	13/06/2024
alpha-BHC	µg/L	<0.001
HCB	µg/L	<0.001
beta-BHC	µg/L	<0.001
gamma-BHC	µg/L	<0.001
Heptachlor	µg/L	<0.001
delta-BHC	µg/L	<0.001
Aldrin	µg/L	<0.001
Heptachlor Epoxide	µg/L	<0.001
gamma-Chlordane	µg/L	<0.001
alpha-Chlordane	µg/L	<0.001
Endosulfan I	µg/L	<0.002
pp-DDE	µg/L	<0.001
Dieldrin	µg/L	<0.001
Endrin	µg/L	<0.001
Endosulfan II	µg/L	<0.002
pp-DDD	µg/L	<0.001
Endrin Aldehyde	µg/L	<0.001
pp-DDT	µg/L	<0.001
Endosulfan Sulphate	µg/L	<0.001
Methoxychlor	µg/L	<0.001
Surrogate 4-Chloro-3-NBTF	%	61

OP in water LL ANZECCF/ADWG		
Our Reference	UNITS	353314-1
Your Reference		BH1
Date Sampled		05/06/2024
Type of sample		Water
Date extracted	-	11/06/2024
Date analysed	-	13/06/2024
Dichlorvos	µg/L	<0.05
Mevinphos	µg/L	<0.05
Phorate	µg/L	<0.05
Dimethoate	µg/L	<0.1
Diazinon	µg/L	<0.01
Disulfoton	µg/L	<0.05
Chlorpyriphos-methyl	µg/L	<0.05
Parathion-Methyl	µg/L	<0.05
Ronnel	µg/L	<0.05
Fenitrothion	µg/L	<0.05
Malathion	µg/L	<0.05
Chlorpyriphos	µg/L	<0.009
Fenthion	µg/L	<0.05
Parathion	µg/L	<0.004
Bromophos ethyl	µg/L	<0.05
Methidathion	µg/L	<0.05
Fenamiphos	µg/L	<0.05
Ethion	µg/L	<0.05
Phosalone	µg/L	<0.05
Azinphos-methyl (Guthion)	µg/L	<0.02
Coumaphos	µg/L	<0.05
Surrogate 4-Chloro-3-NBTF	%	61

PCBs in Water - Trace Level		
Our Reference		353314-1
Your Reference	UNITS	BH1
Date Sampled		05/06/2024
Type of sample		Water
Date extracted	-	11/06/2024
Date analysed	-	13/06/2024
Aroclor 1016	µg/L	<0.01
Aroclor 1221	µg/L	<0.01
Aroclor 1232	µg/L	<0.01
Aroclor 1242	µg/L	<0.01
Aroclor 1248	µg/L	<0.01
Aroclor 1254	µg/L	<0.01
Aroclor 1260	µg/L	<0.01
Surrogate 2-Fluorobiphenyl	%	64

PFAS in Water LOW LEVEL Short		
Our Reference	UNITS	353314-1
Your Reference		BH1
Date Sampled		05/06/2024
Type of sample		Water
Date prepared	-	11/06/2024
Date analysed	-	11/06/2024
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.004
Perfluorooctanesulfonic acid PFOS	µg/L	0.008
Perfluorooctanoic acid PFOA	µg/L	0.016
6:2 FTS	µg/L	<0.001
8:2 FTS	µg/L	<0.002
Surrogate $^{13}C_8$ *PFOS*	%	105
Surrogate $^{13}C_2$ *PFOA*	%	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%	85
Extracted ISTD $^{13}C_4$ *PFOS*	%	82
Extracted ISTD $^{13}C_4$ *PFOA*	%	89
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	107
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	90
Total Positive PFHxS & PFOS	µg/L	0.012
Total Positive PFOA & PFOS	µg/L	0.023
Total Positive PFAS	µg/L	0.028

HM in water - dissolved			
Our Reference		353314-1	353314-2
Your Reference	UNITS	BH1	BH510
Date Sampled		05/06/2024	05/06/2024
Type of sample		Water	Water
Date prepared	-	11/06/2024	11/06/2024
Date analysed	-	11/06/2024	11/06/2024
Arsenic-Dissolved	µg/L	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	<1	<1
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1
Zinc-Dissolved	µg/L	5	2
Iron-Dissolved	µg/L	16,000	[NA]

HM in water - total		
Our Reference		353314-1
Your Reference	UNITS	BH1
Date Sampled		05/06/2024
Type of sample		Water
Date prepared	-	11/06/2024
Date analysed	-	11/06/2024
Iron-Total	µg/L	24,000

Miscellaneous Inorganics		
Our Reference		353314-1
Your Reference	UNITS	BH1
Date Sampled		05/06/2024
Type of sample		Water
Date prepared	-	12/06/2024
Date analysed	-	12/06/2024
Total Suspended Solids	mg/L	110
Total Dissolved Solids (grav)	mg/L	530

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
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. Salt forms (e.g. FeO, PbO, ZnO) are determined stoichiometrically from the base metal concentration.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS.
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

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

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date Extracted	-			07/06/2024	1	07/06/2024	11/06/2024		07/06/2024	[NT]
Date Analysed	-			11/06/2024	1	11/06/2024	12/06/2024		11/06/2024	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	1	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	105	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Dibromomethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	109	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	100	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	1	<1	<1	0	108	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	1	<1	<1	0	112	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Bromoform	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	111	[NT]
Styrene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	111	1	114	115	1	104	[NT]
Surrogate Toluene-d8	%		Org-023	99	1	99	99	0	100	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	95	1	95	98	3	102	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			07/06/2024	1	07/06/2024	11/06/2024		07/06/2024	[NT]
Date analysed	-			11/06/2024	1	11/06/2024	12/06/2024		11/06/2024	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	1	<10	<10	0	110	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	1	<10	<10	0	110	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	111	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	111	1	114	115	1	104	[NT]
Surrogate Toluene-d8	%		Org-023	99	1	99	99	0	100	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	95	1	95	98	3	102	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			07/06/2024	[NT]	[NT]	[NT]	[NT]	07/06/2024	[NT]
Date analysed	-			08/06/2024	[NT]	[NT]	[NT]	[NT]	08/06/2024	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-020	84	[NT]	[NT]	[NT]	[NT]	117	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
Naphthalene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Fluorene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	89	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: OCPs in Water - Trace Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
alpha-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	96	[NT]
HCB	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	100	[NT]
gamma-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	94	[NT]
delta-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	92	[NT]
Heptachlor Epoxide	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	102	[NT]
gamma-Chlordane	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.002	Org-022/025	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	92	[NT]
Dieldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	88	[NT]
Endrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	102	[NT]
Endosulfan II	µg/L	0.002	Org-022/025	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	96	[NT]
Endrin Aldehyde	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	94	[NT]
Methoxychlor	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	91	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
Dichlorvos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mevinphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Phorate	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	µg/L	0.1	Org-022/025	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Disulfoton	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion-Methyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	80	[NT]
Fenitrothion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	90	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chlorpyriphos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	94	[NT]
Fenthion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Parathion	µg/L	0.004	Org-022/025	<0.004	[NT]	[NT]	[NT]	[NT]	92	[NT]
Bromophos ethyl	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methidathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fenamiphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Phosalone	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Coumaphos	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	91	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: PCBs in Water - Trace Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
Aroclor 1016	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	111	[NT]
Aroclor 1260	µg/L	0.01	Org-021/022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	91	[NT]	[NT]	[NT]	[NT]	104	[NT]

QUALITY CONTROL: PFAS in Water LOW LEVEL Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	111	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	105	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	101	[NT]
6:2 FTS	µg/L	0.001	Org-029	<0.001	[NT]	[NT]	[NT]	[NT]	100	[NT]
8:2 FTS	µg/L	0.002	Org-029	<0.002	[NT]	[NT]	[NT]	[NT]	105	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	96	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	86	[NT]	[NT]	[NT]	[NT]	85	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	79	[NT]	[NT]	[NT]	[NT]	81	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	102	[NT]	[NT]	[NT]	[NT]	97	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	109	[NT]	[NT]	[NT]	[NT]	127	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	117	[NT]	[NT]	[NT]	[NT]	128	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			11/06/2024	2	11/06/2024	11/06/2024		11/06/2024	[NT]
Date analysed	-			11/06/2024	2	11/06/2024	11/06/2024		11/06/2024	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	90	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	2	<0.1	<0.1	0	90	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	89	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	88	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	91	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	2	<0.05	[NT]		103	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	2	<1	<1	0	90	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	2	2	2	0	91	[NT]
Iron-Dissolved	µg/L	10	Metals-022	<10	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: HM in water - total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date prepared	-			11/06/2024	1	11/06/2024	11/06/2024		11/06/2024	[NT]
Date analysed	-			11/06/2024	1	11/06/2024	11/06/2024		11/06/2024	[NT]
Iron-Total	µg/L	10	Metals-022	<10	1	24000	24000	0	91	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
Date analysed	-			12/06/2024	[NT]	[NT]	[NT]	[NT]	12/06/2024	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	[NT]	[NT]	[NT]	[NT]	98	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	71015.55	**Suburb:**	Brookvale	**To:**	Lab name
Project Manager:	Kurt Plambeck	**Order Number:**		**Sampler:** CSY	Lab address
Email:	Kurt.Plambeck@douglaspartners.com.au			**Attn:**	Name
Turnaround time	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				Lab phone Lab email
Prior Storage	☐ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**		☐ No ☐ Yes	(Yes ES, handle, transport, store in accordance with FPM HAZID)

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass p - plastic	Analytes: TRH BTEX metals	PAH Low	OCP, OPP, PCB trace	PFAS short low	Iron (total and dissolved)	VOC	TDS	TSS		BTEX		Notes/ Preservation/ Additional Requirements
1	BH1			5/06/24	W	G	X	X	X	X	X	X	X	X				
2	BH510			5/06/24	W	G	X	X				X						
3	BD1/20240506			5/06/24	W	G						X						
4	TS			5/06/24	W	G										X		
5	TB			5/06/24	W	G										X		
6	Rinsate			5/06/24	W	G									X			

ENVIROLAB GROUP

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

Job No: 353314

Date Received: 6/6/24
Time Received: 1400
Received By: KW
Temp: ~~Cool~~/Ambient
Cooling: Ice/~~Icepack~~ 11°C
Security: ~~Intact~~/Broken/None

Metals to analyse:

Number of samples in container:

Transported to laboratory by:

Send results to: Douglas Partners Pty Ltd

Address: 96 Hermitage Road, West Ryde NSW 2114 **Phone:** (02) 9809 0666

Relinquished by: KDP **Date:** 6/06/2024 **Signed:** KP

LAB RECEIPT

Lab Ref. No: 353314

Received by: Katy Wayne

Date & Time 6/6/24 1400

Signed:

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck

Sample Login Details

Your reference	71015.55 Brookvale
Envirolab Reference	353314
Date Sample Received	06/06/2024
Date Instructions Received	06/06/2024
Date Results Expected to be Reported	14/06/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	6 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	OCPs in Water - Trace Level	OP in water LL ANZECCF/ADWG	PCBs in Water - Trace Level	PFAS in Water LOW LEVEL Short	HM in water - dissolved	HM in water - total	Total Suspended Solids	Total Dissolved Solids(grav)
BH1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH510	✓	✓	✓	✓					✓			
BD1/20240506	✓											
TS		✓										
TB		✓										
Rinsate	✓											

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 352943

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**71015.55, Brookvale**
Number of Samples	11 Soil
Date samples received	03/06/2024
Date completed instructions received	03/06/2024

Analysis Details

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

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

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

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

Report Details

Date results requested by	11/06/2024
Date of Issue	11/06/2024

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VOCs in soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date Extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date Analysed	-	11/06/2024	11/06/2024	11/06/2024	11/06/2024	11/06/2024
Dichlorodifluoromethane	mg/kg	<1	<1	<1	<1	<1
Chloromethane	mg/kg	<1	<1	<1	<1	<1
Vinyl Chloride	mg/kg	<1	<1	<1	<1	<1
Bromomethane	mg/kg	<1	<1	<1	<1	<1
Chloroethane	mg/kg	<1	<1	<1	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1	<1	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	mg/kg	<1	<1	<1	<1	<1
1,1-Dichloroethane	mg/kg	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	mg/kg	<1	<1	<1	<1	<1
Bromochloromethane	mg/kg	<1	<1	<1	<1	<1
Chloroform	mg/kg	<1	<1	<1	<1	<1
2,2-Dichloropropane	mg/kg	<1	<1	<1	<1	<1
1,2-Dichloroethane	mg/kg	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	mg/kg	<1	<1	<1	<1	<1
1,1-Dichloropropene	mg/kg	<1	<1	<1	<1	<1
Cyclohexane	mg/kg	<1	<1	<1	<1	<1
Carbon Tetrachloride	mg/kg	<1	<1	<1	<1	<1
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dibromomethane	mg/kg	<1	<1	<1	<1	<1
1,2-Dichloropropane	mg/kg	<1	<1	<1	<1	<1
Trichloroethene	mg/kg	<1	<1	<1	<1	<1
Bromodichloromethane	mg/kg	<1	<1	<1	<1	<1
trans-1,3-Dichloropropene	mg/kg	<1	<1	<1	<1	<1
cis-1,3-Dichloropropene	mg/kg	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	mg/kg	<1	<1	<1	<1	<1
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropane	mg/kg	<1	<1	<1	<1	<1
Dibromochloromethane	mg/kg	<1	<1	<1	<1	<1
1,2-Dibromoethane	mg/kg	<1	<1	<1	<1	<1
Tetrachloroethene	mg/kg	<1	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	mg/kg	<1	<1	<1	<1	<1
Chlorobenzene	mg/kg	<1	<1	<1	<1	<1

VOCs in soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
Bromoform	mg/kg	<1	<1	<1	<1	<1
m+p-Xylene	mg/kg	<2	<2	<2	<2	<2
Styrene	mg/kg	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	mg/kg	<1	<1	<1	<1	<1
o-Xylene	mg/kg	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	mg/kg	<1	<1	<1	<1	<1
Isopropylbenzene	mg/kg	<1	<1	<1	<1	<1
Bromobenzene	mg/kg	<1	<1	<1	<1	<1
n-Propylbenzene	mg/kg	<1	<1	<1	<1	<1
2-Chlorotoluene	mg/kg	<1	<1	<1	<1	<1
4-Chlorotoluene	mg/kg	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	mg/kg	<1	<1	<1	<1	<1
tert-Butylbenzene	mg/kg	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	mg/kg	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
sec-Butylbenzene	mg/kg	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
4-Isopropyltoluene	mg/kg	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	mg/kg	<1	<1	<1	<1	<1
n-Butylbenzene	mg/kg	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	mg/kg	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	mg/kg	<1	<1	<1	<1	<1
Hexachlorobutadiene	mg/kg	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	mg/kg	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	107	108	108	107	107
Surrogate aaa-Trifluorotoluene	%	90	97	96	92	82
Surrogate Toluene-d_8	%	108	109	108	109	108
Surrogate 4-Bromofluorobenzene	%	94	93	94	94	94

VOCs in soil				
Our Reference		352943-6	352943-7	352943-8
Your Reference	UNITS	BH02	BH02	BH02
Depth		1.4-1.6	2.3-2.5	5.2-5.3
Date Sampled		28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date Extracted	-	04/06/2024	04/06/2024	04/06/2024
Date Analysed	-	11/06/2024	11/06/2024	11/06/2024
Dichlorodifluoromethane	mg/kg	<1	<1	<1
Chloromethane	mg/kg	<1	<1	<1
Vinyl Chloride	mg/kg	<1	<1	<1
Bromomethane	mg/kg	<1	<1	<1
Chloroethane	mg/kg	<1	<1	<1
Trichlorofluoromethane	mg/kg	<1	<1	<1
1,1-Dichloroethene	mg/kg	<1	<1	<1
trans-1,2-Dichloroethene	mg/kg	<1	<1	<1
1,1-Dichloroethane	mg/kg	<1	<1	<1
cis-1,2-Dichloroethene	mg/kg	<1	<1	<1
Bromochloromethane	mg/kg	<1	<1	<1
Chloroform	mg/kg	<1	<1	<1
2,2-Dichloropropane	mg/kg	<1	<1	<1
1,2-Dichloroethane	mg/kg	<1	<1	<1
1,1,1-Trichloroethane	mg/kg	<1	<1	<1
1,1-Dichloropropene	mg/kg	<1	<1	<1
Cyclohexane	mg/kg	<1	<1	<1
Carbon Tetrachloride	mg/kg	<1	<1	<1
Benzene	mg/kg	<0.2	<0.2	<0.2
Dibromomethane	mg/kg	<1	<1	<1
1,2-Dichloropropane	mg/kg	<1	<1	<1
Trichloroethene	mg/kg	<1	<1	<1
Bromodichloromethane	mg/kg	<1	<1	<1
trans-1,3-Dichloropropene	mg/kg	<1	<1	<1
cis-1,3-Dichloropropene	mg/kg	<1	<1	<1
1,1,2-Trichloroethane	mg/kg	<1	<1	<1
Toluene	mg/kg	<0.5	<0.5	<0.5
1,3-Dichloropropane	mg/kg	<1	<1	<1
Dibromochloromethane	mg/kg	<1	<1	<1
1,2-Dibromoethane	mg/kg	<1	<1	<1
Tetrachloroethene	mg/kg	<1	<1	<1
1,1,1,2-Tetrachloroethane	mg/kg	<1	<1	<1
Chlorobenzene	mg/kg	<1	<1	<1

VOCs in soil				
Our Reference		352943-6	352943-7	352943-8
Your Reference	UNITS	BH02	BH02	BH02
Depth		1.4-1.6	2.3-2.5	5.2-5.3
Date Sampled		28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Ethylbenzene	mg/kg	<1	<1	<1
Bromoform	mg/kg	<1	<1	<1
m+p-Xylene	mg/kg	<2	<2	<2
Styrene	mg/kg	<1	<1	<1
1,1,2,2-Tetrachloroethane	mg/kg	<1	<1	<1
o-Xylene	mg/kg	<1	<1	<1
1,2,3-Trichloropropane	mg/kg	<1	<1	<1
Isopropylbenzene	mg/kg	<1	<1	<1
Bromobenzene	mg/kg	<1	<1	<1
n-Propylbenzene	mg/kg	<1	<1	<1
2-Chlorotoluene	mg/kg	<1	<1	<1
4-Chlorotoluene	mg/kg	<1	<1	<1
1,3,5-Trimethylbenzene	mg/kg	<1	<1	<1
tert-Butylbenzene	mg/kg	<1	<1	<1
1,2,4-Trimethylbenzene	mg/kg	<1	<1	<1
1,3-Dichlorobenzene	mg/kg	<1	<1	<1
sec-Butylbenzene	mg/kg	<1	<1	<1
1,4-Dichlorobenzene	mg/kg	<1	<1	<1
4-Isopropyltoluene	mg/kg	<1	<1	<1
1,2-Dichlorobenzene	mg/kg	<1	<1	<1
n-Butylbenzene	mg/kg	<1	<1	<1
1,2-Dibromo-3-chloropropane	mg/kg	<1	<1	<1
1,2,4-Trichlorobenzene	mg/kg	<1	<1	<1
Hexachlorobutadiene	mg/kg	<1	<1	<1
1,2,3-Trichlorobenzene	mg/kg	<1	<1	<1
Surrogate Dibromofluoromethane	%	105	106	106
Surrogate aaa-Trifluorotoluene	%	103	104	107
Surrogate Toluene-d_8	%	108	106	108
Surrogate 4-Bromofluorobenzene	%	94	94	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	11/06/2024	11/06/2024	11/06/2024	11/06/2024	11/06/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	90	97	96	92	82

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		352943-6	352943-7	352943-8	352943-9	352943-10
Your Reference	UNITS	BH02	BH02	BH02	BD1	TS1
Depth		1.4-1.6	2.3-2.5	5.2-5.3	-	-
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024	29/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	11/06/2024	11/06/2024	11/06/2024	11/06/2024	11/06/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	[NA]
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	90%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	92%
Ethylbenzene	mg/kg	<1	<1	<1	<1	90%
m+p-xylene	mg/kg	<2	<2	<2	<2	91%
o-Xylene	mg/kg	<1	<1	<1	<1	90%
Naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	103	104	107	99	91%

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		352943-11
Your Reference	UNITS	TB1
Depth		-
Date Sampled		29/05/2024
Type of sample		Soil
Date extracted	-	04/06/2024
Date analysed	-	11/06/2024
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
Naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	109

svTRH (C10-C40) in Soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	77	76	88	81	82

svTRH (C10-C40) in Soil					
Our Reference		352943-6	352943-7	352943-8	352943-9
Your Reference	UNITS	BH02	BH02	BH02	BD1
Depth		1.4-1.6	2.3-2.5	5.2-5.3	-
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	05/06/2024	05/06/2024	05/06/2024	05/06/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	75	76	75	75

PAHs in Soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.08	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.2	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	93	99	99	97	100

PAHs in Soil				
Our Reference		352943-6	352943-7	352943-8
Your Reference	UNITS	BH02	BH02	BH02
Depth		1.4-1.6	2.3-2.5	5.2-5.3
Date Sampled		28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	96	94	99

Organochlorine Pesticides in soil				
Our Reference		352943-1	352943-5	352943-6
Your Reference	UNITS	BH01	BH02	BH02
Depth		1.4-1.5	0.35-0.5	1.4-1.6
Date Sampled		29/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	84	86	81

Organophosphorus Pesticides in Soil				
Our Reference		352943-1	352943-5	352943-6
Your Reference	UNITS	BH01	BH02	BH02
Depth		1.4-1.5	0.35-0.5	1.4-1.6
Date Sampled		29/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	84	86	81

PCBs in Soil				
Our Reference		352943-1	352943-5	352943-6
Your Reference	UNITS	BH01	BH02	BH02
Depth		1.4-1.5	0.35-0.5	1.4-1.6
Date Sampled		29/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	0.1	<0.1	0.2
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	0.1	<0.1	0.2
Surrogate 2-Fluorobiphenyl	%	83	89	86

Acid Extractable metals in soil						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	06/06/2024	06/06/2024	06/06/2024	06/06/2024	06/06/2024
Arsenic	mg/kg	<4	<4	<4	<4	<8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	7	12	10	57
Copper	mg/kg	4	5	3	3	<1
Lead	mg/kg	9	13	16	12	4
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	2	4	3	4
Zinc	mg/kg	12	18	12	6	5

Acid Extractable metals in soil						
Our Reference		352943-6	352943-7	352943-8	352943-9	352943-12
Your Reference	UNITS	BH02	BH02	BH02	BD1	BH01 - [TRIPLICATE]
Depth		1.4-1.6	2.3-2.5	5.2-5.3	-	1.4-1.5
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024	29/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	06/06/2024	06/06/2024	06/06/2024	06/06/2024	06/06/2024
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	13	2	1	9
Copper	mg/kg	13	2	27	<1	5
Lead	mg/kg	16	13	2	1	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	4	5	<1	3
Zinc	mg/kg	19	15	19	1	16

Misc Soil - Inorg				
Our Reference		352943-1	352943-5	352943-6
Your Reference	UNITS	BH01	BH02	BH02
Depth		1.4-1.5	0.35-0.5	1.4-1.6
Date Sampled		29/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	04/06/2024	04/06/2024	04/06/2024
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Misc Inorg - Soil				
Our Reference		352943-1	352943-4	352943-8
Your Reference	UNITS	BH01	BH01	BH02
Depth		1.4-1.5	3.4-3.5	5.2-5.3
Date Sampled		29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	03/06/2024	03/06/2024	03/06/2024
Date analysed	-	06/06/2024	06/06/2024	06/06/2024
pH 1:5 soil:water	pH Units	6.7	6.4	5.3
Electrical Conductivity 1:5 soil:water	µS/cm	58	81	190
Chloride, Cl 1:5 soil:water	mg/kg	<10	10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	21	78	320

Moisture						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-5
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	0.35-0.5
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	05/06/2024	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Moisture	%	20	19	39	38	18

Moisture					
Our Reference		352943-6	352943-7	352943-8	352943-9
Your Reference	UNITS	BH02	BH02	BH02	BD1
Depth		1.4-1.6	2.3-2.5	5.2-5.3	-
Date Sampled		28/05/2024	28/05/2024	28/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	04/06/2024	04/06/2024	04/06/2024	04/06/2024
Date analysed	-	05/06/2024	05/06/2024	05/06/2024	05/06/2024
Moisture	%	23	32	16	18

Asbestos ID - soils NEPM						
Our Reference		352943-1	352943-2	352943-3	352943-4	352943-6
Your Reference	UNITS	BH01	BH01	BH01	BH01	BH02
Depth		1.4-1.5	1.9-2	2.9-3	3.4-3.5	1.4-1.6
Date Sampled		29/05/2024	29/05/2024	29/05/2024	29/05/2024	28/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	07/06/2024	07/06/2024	07/06/2024	07/06/2024	07/06/2024
Sample mass tested	g	820.84	334.65	474.4	138.71	699.96
Sample Description	-	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001
Asbestos comments	-	Nil	Nil	Nil	Nil	Nil

Asbestos ID - soils NEPM			
Our Reference		352943-7	352943-8
Your Reference	UNITS	BH02	BH02
Depth		2.3-2.5	5.2-5.3
Date Sampled		28/05/2024	28/05/2024
Type of sample		Soil	Soil
Date analysed	-	07/06/2024	07/06/2024
Sample mass tested	g	562.14	203.8
Sample Description	-	Grey coarse-grained soil & rocks	Grey coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–
FA and AF Estimation*	g	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001
Asbestos comments	-	Nil	Nil

Asbestos ID - soils		
Our Reference		352943-5
Your Reference	UNITS	BH02
Depth		0.35-0.5
Date Sampled		28/05/2024
Type of sample		Soil
Date analysed	-	11/06/2024
Sample mass tested	g	Approx. 25g
Sample Description	-	Orange clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Asbestos comments	-	Nil
Trace Analysis	-	No asbestos detected

PFAS in Soils Short		
Our Reference		352943-5
Your Reference	UNITS	BH02
Depth		0.35-0.5
Date Sampled		28/05/2024
Type of sample		Soil
Date prepared	-	05/06/2024
Date analysed	-	05/06/2024
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.1
Perfluorooctanesulfonic acid PFOS	µg/kg	<0.1
Perfluorooctanoic acid PFOA	µg/kg	<0.1
6:2 FTS	µg/kg	<0.1
8:2 FTS	µg/kg	<0.2
Surrogate $^{13}C_8$ *PFOS*	%	106
Surrogate $^{13}C_2$ *PFOA*	%	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%	96
Extracted ISTD $^{13}C_4$ *PFOS*	%	95
Extracted ISTD $^{13}C_4$ *PFOA*	%	113
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	120
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	130
Total Positive PFHxS & PFOS	µg/kg	<0.1
Total Positive PFOS & PFOA	µg/kg	<0.1
Total Positive PFAS	µg/kg	<0.1

PFAS in TCLP Short		
Our Reference		352943-5
Your Reference	UNITS	BH02
Depth		0.35-0.5
Date Sampled		28/05/2024
Type of sample		Soil
Date prepared	-	05/06/2024
Date analysed	-	05/06/2024
pH of soil for fluid# determ.	pH units	7.9
pH of soil TCLP (after HCl)	pH units	1.8
Extraction fluid used		1
pH of final Leachate	pH units	4.9
Perfluorohexanesulfonic acid - PFHxS	µg/L	<0.01
Perfluorooctanesulfonic acid PFOS	µg/L	<0.01
Perfluorooctanoic acid PFOA	µg/L	<0.01
6:2 FTS	µg/L	<0.01
8:2 FTS	µg/L	<0.02
Surrogate $^{13}C_8$ *PFOS*	%	108
Surrogate $^{13}C_2$ *PFOA*	%	94
Extracted ISTD $^{18}O_2$ *PFHxS*	%	103
Extracted ISTD $^{13}C_4$ *PFOS*	%	100
Extracted ISTD $^{13}C_4$ *PFOA*	%	118
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	102
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	191
Total Positive PFHxS & PFOS	µg/L	<0.01
Total Positive PFOS & PFOA	µg/L	<0.01
Total Positive PFAS	µg/L	<0.01

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. NOTE#1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF relative to the sample mass tested) NOTE#2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439. Please note that the mass used may be scaled down from default based on sample mass available. Samples are stored at 2-6oC before and after leachate preparation.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.

Method ID	Methodology Summary
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
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-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. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-021/022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD and/or GC-MS/GC-MSMS. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing 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.
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. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-029	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. TCLPs/ASLP leachates are centrifuged, the supernatant is then analysed (including amendment with solvent) - as per the option in AS4439.3. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.4 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.

QUALITY CONTROL: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date Extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date Analysed	-			11/06/2024	1	11/06/2024	11/06/2024		11/06/2024	11/06/2024
Dichlorodifluoromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Vinyl Chloride	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromomethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trichlorofluoromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1-Dichloroethene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
trans-1,2-Dichloroethene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1-Dichloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	91	102
cis-1,2-Dichloroethene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromochloromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chloroform	mg/kg	1	Org-023	<1	1	<1	<1	0	91	102
2,2-Dichloropropane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-Dichloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	78	89
1,1,1-Trichloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	81
1,1-Dichloropropene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Cyclohexane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Carbon Tetrachloride	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	72	84
Dibromomethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-Dichloropropane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Trichloroethene	mg/kg	1	Org-023	<1	1	<1	<1	0	72	86
Bromodichloromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	76	89
trans-1,3-Dichloropropene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
cis-1,3-Dichloropropene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2-Trichloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	90	100
1,3-Dichloropropane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Dibromochloromethane	mg/kg	1	Org-023	<1	1	<1	<1	0	74	87
1,2-Dibromoethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Tetrachloroethene	mg/kg	1	Org-023	<1	1	<1	<1	0	84	95
1,1,1,2-Tetrachloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Chlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	76	89
Bromoform	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
m+p-Xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	76	89
Styrene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,1,2,2-Tetrachloroethane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	75	88
1,2,3-Trichloropropane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Isopropylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Bromobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-Propylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
2-Chlorotoluene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-Chlorotoluene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3,5-Trimethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
tert-Butylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-Trimethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,3-Dichlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
sec-Butylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,4-Dichlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
4-Isopropyltoluene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-Dichlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
n-Butylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2-Dibromo-3-chloropropane	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,4-Trichlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
1,2,3-Trichlorobenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	99	1	107	107	0	102	100
Surrogate aaa-Trifluorotoluene	%		Org-023	91	1	90	92	2	86	97
Surrogate Toluene-d_8	%		Org-023	99	1	108	108	0	101	98
Surrogate 4-Bromofluorobenzene	%		Org-023	99	1	94	94	0	99	100

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			11/06/2024	1	11/06/2024	11/06/2024		11/06/2024	11/06/2024
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	80	90
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	80	90
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	72	84
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	90	100
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	76	89
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	76	89
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	75	88
Naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	91	1	90	92	2	86	97

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			05/06/2024	1	05/06/2024	05/06/2024		05/06/2024	05/06/2024
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	114	101
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	<100	<100	0	109	101
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	<100	<100	0	86	102
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	<50	0	114	101
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	<100	<100	0	109	101
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	<100	<100	0	86	102
Surrogate o-Terphenyl	%		Org-020	81	1	77	77	0	85	82

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	80
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	88
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	84
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	90
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	92
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	92
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	76	70
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	<0.05	<0.05	0	82	88
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	101	1	93	97	4	96	94

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	86
HCB	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	88
gamma-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	88
delta-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	94
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	98
gamma-Chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	88
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	98	98
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	94	94
Endosulfan II	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	98
Endrin Aldehyde	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	82
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Mirex	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	89	1	84	87	4	91	101

QUALITY CONTROL: Organophosphorus Pesticides in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	106	100
Mevinphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Phorate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Disulfoton	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyrifos-methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion-Methyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	98
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	98
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	104	104
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	98
Fenthion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	94
Bromophos-ethyl	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Methidathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fenamiphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	100	104
Phosalone	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Coumaphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	89	1	84	87	4	91	101

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date extracted	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Aroclor 1016	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021/022/025	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	86	92
Aroclor 1260	mg/kg	0.1	Org-021/022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate 2-Fluorobiphenyl	%		Org-021/022/025	90	1	83	90	8	92	89

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date prepared	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			06/06/2024	1	06/06/2024	06/06/2024		06/06/2024	06/06/2024
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	102	#
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	93	73
Chromium	mg/kg	1	Metals-020	<1	1	19	9	71	106	87
Copper	mg/kg	1	Metals-020	<1	1	4	6	40	98	88
Lead	mg/kg	1	Metals-020	<1	1	9	13	36	115	74
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	101	87
Nickel	mg/kg	1	Metals-020	<1	1	3	2	40	94	72
Zinc	mg/kg	1	Metals-020	<1	1	12	26	74	97	71

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	352943-5
Date prepared	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Date analysed	-			04/06/2024	1	04/06/2024	04/06/2024		04/06/2024	04/06/2024
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	102	95

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			03/06/2024	[NT]	[NT]	[NT]	[NT]	03/06/2024	[NT]
Date analysed	-			06/06/2024	[NT]	[NT]	[NT]	[NT]	06/06/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	109	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	115	[NT]

QUALITY CONTROL: PFAS in Soils Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			05/06/2024	[NT]	[NT]	[NT]	[NT]	05/06/2024	[NT]
Date analysed	-			05/06/2024	[NT]	[NT]	[NT]	[NT]	05/06/2024	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Perfluorooctanesulfonic acid PFOS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Perfluorooctanoic acid PFOA	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
6:2 FTS	µg/kg	0.1	Org-029	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
8:2 FTS	µg/kg	0.2	Org-029	<0.2	[NT]	[NT]	[NT]	[NT]	95	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	101	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	99	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	102	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	106	[NT]	[NT]	[NT]	[NT]	107	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	119	[NT]	[NT]	[NT]	[NT]	116	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	121	[NT]	[NT]	[NT]	[NT]	120	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	124	[NT]	[NT]	[NT]	[NT]	138	[NT]

QUALITY CONTROL: PFAS in TCLP Short						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			05/06/2024	[NT]	[NT]	[NT]	[NT]	05/06/2024	[NT]
Date analysed	-			05/06/2024	[NT]	[NT]	[NT]	[NT]	05/06/2024	[NT]
Perfluorohexanesulfonic acid - PFHxS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	107	[NT]
Perfluorooctanesulfonic acid PFOS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	95	[NT]
Perfluorooctanoic acid PFOA	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	107	[NT]
6:2 FTS	µg/L	0.01	Org-029	<0.01	[NT]	[NT]	[NT]	[NT]	102	[NT]
8:2 FTS	µg/L	0.02	Org-029	<0.02	[NT]	[NT]	[NT]	[NT]	117	[NT]
Surrogate $^{13}C_8$ *PFOS*	%		Org-029	99	[NT]	[NT]	[NT]	[NT]	96	[NT]
Surrogate $^{13}C_2$ *PFOA*	%		Org-029	98	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-029	96	[NT]	[NT]	[NT]	[NT]	98	[NT]
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-029	100	[NT]	[NT]	[NT]	[NT]	103	[NT]
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-029	103	[NT]	[NT]	[NT]	[NT]	99	[NT]
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-029	83	[NT]	[NT]	[NT]	[NT]	93	[NT]
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-029	105	[NT]	[NT]	[NT]	[NT]	114	[NT]

Result Definitions

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

Quality Control Definitions

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

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

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

Acid Extractable Metals in Soil:
- The laboratory RPD acceptance criteria has been exceeded for 352943-1 for Cr & Zn. Therefore a triplicate result has been issued as laboratory sample number 352943-12.
- # Low spike recovery was obtained for this sample. Sample matrix interference is suspected. However, an acceptable recovery was obtained for the LCS.
- The PQL(s) for 352943-5 has been raised for As due to the low spike recovery/recoveries. This may reflect other samples where similar in matrix and similar analytical interferences occur.

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013. This is reported outside our scope of NATA accreditation.

Note: All samples analysed as received. However, samples 352943-2, 4, 8 are below the minimum recommended 500mL sample volume as per National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.

Asbestos: A portion of the supplied sample was sub-sampled for asbestos according to ASB-001 asbestos subsampling procedure. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab/MPL recommends supplying 40-60g or 500ml of sample in its own container.
Note: Sample 352943-5 was sub-sampled from jar provided by the client.

RV COC 3/6 15:15

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	71015.55	**Suburb:**	Brookvale	**To:**	Lab name
Project Manager:	Kurt Plambeck	**Order Number:**		**Sampler:** CSY	Lab address
Email:	Kurt.Plambeck@douglaspartners.com.au			**Attn:**	Name
Turnaround time	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				Lab phone Lab email
Prior Storage	☐ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**		☐ No	☐ Yes (if YES, handle, transport, store in accordance with FPM HAZID)

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: 8A	8AFFA	3AFFA	VOC	BTEX	PFAS (short total and TCLP)	HM BTEX	Aggresivity				Notes/ Preservation/ Additional Requirements
1	BH01	1.4	1.5	29/05/24	S	G/P		X		X				X				
2	BH01	1.9	2	29/05/24	S	G/P			X	X								
3	BH01	2.9	3	29/05/24	S	G/P			X	X								
4	BH01	3.4	3.5	29/05/24	S	G/P			X	X				X				
5	BH02	0.35	0.5	28/05/24	S	G/P	X			X		X						
6	BH02	1.4	1.6	28/05/24	S	G/P		X		X								
7	BH02	2.3	2.5	28/05/24	S	G/P			X	X								
8	BH02	5.2	5.3	28/05/24	S	G/P			X	X				X				
9	BD1			28/05/24	S	G							X					
10	TS1			29/05/24	S	G					X							
11	TB1			29/05/24	S	G					X							

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

Job No: 352943
Date Received: 3/6/24
Time Received: 1340
Received By: KW
Temp: Cool/Ambient 4°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Metals to analyse:			
Number of samples in container:		**Transported to laboratory by:**	
Send results to:	Douglas Partners Pty Ltd		
Address:	96 Hermitage Road, West Ryde NSW 2114	**Phone:**	(02) 9809 0666
Relinquished by:	KDP	**Date:**	03/06/2024
		Signed:	

LAB RECEIPT

Lab Ref. No:	352943
Received by:	Katy Lugo
Date & Tim:	3/6/24 1340
Signed:	

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 71015.55	**Suburb:** Brookvale		**To:** Lab name
Project Manager: Kurt Plambeck	**Order Number:**	**Sampler:** CSY	Lab address
Email: Kurt.Plambeck@douglaspartners.com.au			**Attn:** Name
Turnaround time ☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day			Lab phone Lab email
Prior Storage ☐ Fridge ☐ Freezer ☐ Esky ☐ Shelf	**Do samples contain 'potential' HBM?** ☐ No ☐ Yes (If YES, handle, transport, store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: 8A	8AFFA	3AFFA	VOC	BTEX	PFAS (short total and TCLP)	HM BTEX					Notes/ Preservation/ Additional Requirements
	BH01	1.4	1.5	29/05/24	S	G/P		X		X								
	BH01	1.9	2	29/05/24	S	G/P			X	X								
	BH01	2.9	3	29/05/24	S	G/P			X	X								
	BH01	3.4	3.5	29/05/24	S	G/P			X	X								#352943
	BH02	0.35	0.5	28/05/24	S	G/P	X			X		X						previous COC
	BH02	1.4	1.6	28/05/24	S	G/P		X		X								
	BH02	2.3	2.5	28/05/24	S	G/P			X	X								
	BH02	5.2	5.3	28/05/24	S	G/P			X	X								
	BD1			28/05/24	S	G							X					
	TS1			29/05/24	S	G					X							
	TB1			29/05/24	S	G					X							

Metals to analyse:			**LAB RECEIPT**
Number of samples in container:	**Transported to laboratory by:**		**Lab Ref. No:**
Send results to: Douglas Partners Pty Ltd			**Received by:**
Address: 96 Hermitage Road, West Ryde NSW 2114	**Phone:** (02) 9809 0666		**Date & Tim**
Relinquished by: KDP	**Date:** 3/06/2024	**Signed:**	**Signed:**

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Kurt Plambeck

Sample Login Details

Your reference	71015.55, Brookvale
Envirolab Reference	352943
Date Sample Received	03/06/2024
Date Instructions Received	03/06/2024
Date Results Expected to be Reported	11/06/2024

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	11 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in soil	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBs in Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Misc Inorg - Soil	Asbestos ID - soils NEPM	Asbestos ID - soils	PFAS in Soils Short	PFAS in TCLP Short
BH01-1.4-1.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
BH01-1.9-2	✓	✓	✓	✓				✓			✓			
BH01-2.9-3	✓	✓	✓	✓				✓			✓			
BH01-3.4-3.5	✓	✓	✓	✓				✓		✓	✓			
BH02-0.35-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
BH02-1.4-1.6	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
BH02-2.3-2.5	✓	✓	✓	✓				✓			✓			
BH02-5.2-5.3	✓	✓	✓	✓				✓		✓	✓			
BD1		✓	✓					✓						
TS1		✓												
TB1		✓												

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Appendix I

Quality Assurance / Quality Control Report

1. Field and laboratory data quality assurance and quality control

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

Table 1: Field and laboratory quality control

Item	Evaluation / acceptance criteria	Compliance
Analytical laboratories used	NATA accreditation	C
Holding times	Various based on type of analysis	C
Intra-laboratory replicates Tables QA1 and QA2	10% of primary samples; <30% RPD	PC
Trip Spikes Table QA4	1 per sampling event; 60-140% recovery	C
Trip Blanks Table QA3	1 per sampling event; <PQL	C
Rinsates Table QA3	1 per groundwater sampling event; <PQL	C
Laboratory / Reagent Blanks	1 per batch; <PQL	C
Laboratory Duplicate	1 per lab batch; As laboratory certificate	C
Matrix Spikes	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Surrogate Spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Control Samples	1 per lab batch; 70-130% recovery (inorganics); 60-140% recovery (organics)	C
Standard Operating Procedures (SOP)	Adopting SOP for all aspects of the sampling field work	C

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

The RPD results were all within the acceptable range, with the exception of those indicated in Table QA1 (results in bold). The exceedances are not, however, considered to be of concern given that:

- The actual differences in the concentrations of the replicate pairs where RPD exceedances occurred were typically low;
- Replicates, rather than homogenised duplicates, were used to minimise risk of volatile loss, hence greater analytical variability between replicate pairs can be expected;
- Most of the recorded concentrations were relatively close to the PQL;
- The majority of RPD results from a replicate pair were within the acceptable limits; and
- All other QA / QC parameters met the data quality indicators.

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

2. Data quality indicators

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

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

Table 2: Data quality indicators

Data quality indicator	Method(s) of achievement
Completeness	Target locations sampled, noting however recommendations for further soil testing for waste classification.
	Preparation of borehole logs, sample location plan and chain of custody records.
	Preparation of field groundwater sampling sheets.
	Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody.
	Samples analysed for contaminants of potential concern (COPC) identified in the conceptual site model (CSM).
	Completion of chain of custody (COC) documentation.

Data quality indicator	Method(s) of achievement
	NATA accredited laboratory results certificates provided by the laboratory.
	Satisfactory frequency and results for field and laboratory quality control (QC) samples as discussed in Section 1.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project.
	Experienced samplers used.
	Use of NATA registered laboratories, with test methods the same or similar between laboratories.
	Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled, noting limitations to the sampling and testing of fill as documented in the report.
	Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQO.
	Samples were extracted and analysed within holding times.
	Samples were analysed in accordance with the COC.
Precision	Field staff followed standard operating procedures.
	Acceptable RPD between original samples and replicates.
	Satisfactory results for all other field and laboratory QC samples.
Accuracy	Field staff followed standard operating procedures.
	Satisfactory results for all field and laboratory QC samples.

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

3. Conclusion

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

4. References

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

Douglas PARTNERS

Table QA1: Relative Percentage Difference Results – Soil Sampling

Lab Report No	Sample ID	Depth	Sample Date	Sample Type	Units	Priority metals								Priority PAH	Priority TRH						TRH		BTEX			
						Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes
352943	BH01	3.4 - 3.5 m	29/05/24	Soil	mg/kg	<4	<0.4	**10**	**3**	**12**	<0.1	**3**	**6**	<1	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1
352943	BD1	0 m	28/05/24	Soil	mg/kg	<4	<0.4	**1**	<1	**1**	<0.1	<1	**1**	<1	<25	<50	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1
			Difference		mg/kg	0	0	9	2	11	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0
			RPD		%	0%	0%	**164%**	**100%**	**169%**	0%	**100%**	**143%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table QA2: Relative Percentage Difference Results – Water Sampling

Lab Report No	Sample ID	Sample Date	Sample Type	Units	BTEX																					
					Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Total Xylenes	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	tetrachloroethene	1,1,2-trichloroethane	1,1,2-trichloroethylene	1,1-dichloroethane	1,1-Dichloroethene	1,1-dichloropropene	1,2,3-trichlorobenzene	1,2,3-trichloropropane	1,2,4-trichlorobenzene	1,2,4-trimethylbenzene	1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,2-dichloroethane
353314	BH1	05/06/24	Water	µg/L	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
353314	BD1/20240506	05/06/24	Water	µg/L	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		Difference		µg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD		%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table QA2: Relative Percentage Difference Results – Water Sampling

Lab Report No	Sample ID	Sample Date	Sample Type	Units	VOC (excluding BTEX)																					
					1,2-dichloropropane	1,3,5-trimethylbenzene	1,3-dichlorobenzene	1,3-dichloropropane	1,4-dichlorobenzene	2,2-dichloropropane	2-chlorotoluene	4-chlorotoluene	4-isopropyltoluene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	carbon tetrachloride	Chloroethane	Vinyl Chloride	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Isopropylbenzene (cumene)	Cyclohexane
353314	BH1	05/06/24	Water	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	<1	<1	<1	<1
353314	BD1/20240506	05/06/24	Water	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<1	<10	<1	<1	<1	<1
		Difference		µg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD		%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table QA2: Relative Percentage Difference Results – Water Sampling

Lab Report No	Sample ID	Sample Date	Sample Type	Units	dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	1,2-dibromoethane	hexachlorobutadiene	Bromomethane	Monochlorobenzene	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene (vinylbenzene)	Tert-butyl benzene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichlorofluoromethane	Sum of detected VOC
353314	BH1	05/06/24	Water	µg/L	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1
353314	BD1/20240506	05/06/24	Water	µg/L	<1	<1	<10	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1
		Difference		µg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		RPD		%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table QA3: Trip and Rinsate Results

Sample ID	Sample Date	Media Being Sampled	Sample Type	Units	Priority PAH	Priority TRH		TRH	BTEX				VOC	Lab Report No
					Naphthalene [b]	TRH C6 - C10	F1 ((C6-C10)-BTEX)	TRH C6 - C9	Benzene	Toluene	Ethylbenzene	Total Xylenes		
TB1	29/05/24	Soil	Soil	mg/kg	<1	<25	<25	<25	<0.2	<0.5	<1	<1	-	352943
TS	5/6/224	groundwater	water	µg/L	<1	<10	<10	<10	<1	<1	<1	<1	-	353314
Rinsate	5/6/224	groundwater	water	µg/L	-	-	-	-	<1	<1	<1	<1	<1	353314

Table QA4: Trip Spike Results – Soil Sampling (% Recovery)

Sample ID	Sample Date	Media Being Sampled	Sample Type	Benzene	Toluene	Ethylbenzene	o-Xylene	m+p-Xylene	Lab Report No
TS1	29/05/24	Soil	Soil	90	92	90	90	91	352943
TS	5/624	groundwater	water	99	99	100	99	100	353314