Douglas Partners
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Report on
Detailed Site Investigation (Contamination)

Proposed Mixed Use Development
136-148 New South Head Road, Edgecliff

Prepared for
Edgecliff Central Pty Ltd

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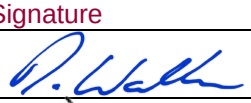
Author		17 March 2021
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Executive Summary

Douglas Partners Pty Ltd (DP) has been engaged by Edgecliff Central Pty Ltd to complete this Detailed Site Investigation (DSI) for contamination for the proposed mixed use development at 136-148 New South Head Road, Edgecliff (the site). The objective of the DSI is to assess the suitability of the site for the proposed development and whether further investigation, remediation and/or management is required.

It is understood that the report will be used to support a development application for the proposed development which is for a mixed use (residential and commercial) tower with three basement levels for car parking, as well as retention of the heritage building at the south-west corner.

The scope of work for the investigation included the collection and analysis of soil samples from seven boreholes (BH1 to BH7) and collection and analysis of groundwater samples from two previously installed groundwater wells (BH1M and BH6M). Intrusive investigations were limited to accessible areas of the site.

The fill, encountered to a maximum depth of 1.3 m, primarily comprised sand. Sandstone, asphaltic concrete, igneous gavel and clay were encountered in the sand fill. Fill was observed to be underlain by sandstone or natural sand then sandstone. Photoionisation detector (PID) results for samples from BH3 to BH7 were all less than 1 ppm, indicating a low potential for the presence of volatile contaminants. No odours were noted during sampling. Potential asbestos-containing materials were not observed whilst sampling. No free groundwater was observed during drilling of boreholes.

For groundwater monitoring well purging and sampling, no phase separated hydrocarbons were noted from use of the dipmeter. No signs of contamination (odours or oil sheen) were observed whilst purging.

In soil, concentrations of total recoverable hydrocarbons (TRH) >C_{16}-C_{34} exceeded the adopted health screening level for direct contact in one sample (from BH7) and concentrations of total polycyclic aromatic hydrocarbons (PAH) and / or benzo(a)pyrene TEQ exceeded the health investigation levels in five soil samples (from BH1, BH2, BH5 and BH7). The elevated concentrations of PAH and TRH are considered to be associated with a component of the fill.

For groundwater, some concentrations of tested metals were above the adopted default guideline values (DGV), however, concentrations of metals were considered to be within typical background ranges. A concentration of dieldrin (from BH1M) was recorded above the adopted DGV, however, given that the recorded dieldrin concentration is of the same order of magnitude as the DGV and the likely receiving water body (Rushcutters Bay) is not in close proximity of the site, it is considered unlikely that the dieldrin in groundwater presents an ecological risk to marine ecology.

Based on the results for PAH in soil samples compared to health-based criteria, it is considered that remediation of contaminated fill will be required for the proposed development. Secondary contaminants that may need to be considered as part of the remediation include TRH, metals and organochlorine pesticides (OCP). Although asbestos-containing materials were not observed whilst sampling, the presence of asbestos in fill cannot be ruled out by the observations made in this investigation.

Prior to remediation, it is recommended that data gaps (for soil, groundwater and / or soil vapour) be addressed through further investigation when access is possible within building footprints and at 148 New South Head Road, Edgecliff. Results of such further investigations may influence the remediation approach.

Given the variable concentrations of PAH and (to a lesser extent) lead in fill, it is recommended that additional testing be undertaken at the time of excavation in order to segregate fill materials into Hazardous Waste, Restricted Solid Waste and General Solid Waste streams for off-site disposal. In addition, fill material will be classified as Special Waste if asbestos contamination is revealed during excavation. Given the presence of contaminants in overlying fill, it is recommended that, at the time of excavation, sampling and testing be undertaken following fill removal to determine/confirm the Virgin Excavated Natural Material (VENM) status of the natural soil and bedrock for off-site disposal.

Results for groundwater analysis indicate that treatment of groundwater (at least for metals and OCP) from dewatering will be required for off-site disposal to stormwater (if undertaken).

Based on the results of the DSI, it is considered that the site can be made suitable for the proposed mixed use (commercial and residential) development subject to implementation of the recommendations made in this report.

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1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by Edgecliff Central Pty Ltd to complete this Detailed Site Investigation (DSI) for contamination for the proposed mixed use development at 136-148 New South Head Road, Edgecliff (the site). The site is shown on Drawing 1, Appendix A.

The objective of the DSI is to assess the suitability of the site for the proposed development and whether further investigation, remediation and / or management is required. It is understood that the report will be used to support a development application for the proposed development.

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

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); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

A preliminary site investigation was undertaken and reported in:

- DP, *Preliminary Site Investigation (Contamination), Proposed Mixed Use Development, 136-148 New South Head Road, Edgecliff*, reference 200333.00.R.001.Rev0, February 2021 (PSI).

Information from the PSI is summarised in this report.

2. Proposed Development

The proposed development is mixed use development (residential and commercial) tower with three basement levels for car parking. The basement levels will cover the majority of the site area. The heritage building at the south-west corner of the site is to be retained and the proposed basement levels will not be within the heritage building footprint. Ramp access to the basement car park will be via Darling Point Road. The ground floor level will primarily be used for retail purposes. No significant landscape areas are proposed, and planter boxes (or similar) are to be adopted.

3. Scope of Work

The scope of work for the DSI was as follows:

- Review of the PSI;
- Setting out of sampling locations and core through pavements;
- Collection of soil samples from two boreholes drilled for geotechnical purposes;
- Collection of soil samples from five boreholes drilled using hand tools;
- Field screening of samples for volatile contaminants using a photoionisation detector (PID);
- Purging of (two) existing groundwater monitoring wells followed by sampling of groundwater using low-flow techniques;
- Analysis of selected soil samples for:
  - Eight priority metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc);
  - Total recoverable hydrocarbons (TRH);
  - Benzene, toluene, ethylbenzene, xylenes (BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Total phenols;
  - Organochlorine pesticides (OCP);
  - Organophosphorus pesticides (OPP);
  - Polychlorinated biphenyls (PCB);
  - Asbestos;
  - Cation exchange capacity (CEC); and
  - Ph.
- Following a review of initial results, conduct Toxicity Characteristic Leaching Procedure (TCLP) testing;
- Analysis of selected groundwater samples for eight priority metals, TRH, BTEX, PAH, speciated phenols, OCP, OPP, PCB, volatile organic compounds (VOC) and hardness; and
- Preparation of this report.

4. Site Information

4.1 Site Identification

The site covers approximately 0.18 ha and comprises four land parcels:

- Lot 1, Deposited Plan 663495 which has street address 136 New South Head Road, Edgecliff;
- Lot 1, Deposited Plan 1092694 which has street address 138-140 New South Head Road, Edgecliff;
- Lot A, Deposited Plan 443992 which has street address 142-146 New South Head Road, Edgecliff; and
- Lot B, Deposited Plan 443992 which has street address 148 New South Head Road, Edgecliff.

The site is bound by New South Head Road to the south and Darling Point Road to the west.

Woollahra Municipal Council is the local government authority. The site is zoned as B4 Mixed Use.

A drawing of the site and site location is included in Appendix A.

4.2 Site Description

A site walkover was undertaken for the PSI on 17 December 2020, however, the walkover was limited to external areas as permission to access internal areas had not been granted. Observations are summarised below.

The property at 136 New South Head Road comprises a two-storey rendered commercial building and appeared to be used for a photographic studio. An external car parking area with minor, strip gardens was at the rear of the property where the asphalt and concrete surfaces were observed to in poor condition. A small entry courtyard covered with concrete slabs was at the south-eastern corner of the site.

The property at 138 - 140 New South Head Road comprises a three to four storey rendered apartment-style building which covers most of this land parcel. Narrow walkways comprising pavers were present at the side and rear of the building.

A semi-detached, two-storey brick building was present at 142-146 and 148 New South Head Road. The property at 142-146 New South Head Road was not tenanted at the time of the site walkover. According to signage, the property at 148 New South Head Road was used by dentists. An old sign shows the property was once (partly) tenanted by XL Dry Cleaners. Courtyards comprising pavers and minor gardens were at the rear of each property. Retaining walls also appeared to be present around the edges of the properties, stepping down to street level at the front of the properties and stepping up to adjacent land at the rear of the properties.

Adjacent and nearby properties appeared to be used for residential or commercial (offices and retail) purposes.

5. Environmental Setting

The site is at approximately 32 m AHD. Slopes at and surrounding the site are generally down to the south and west.

According to the NSW Seamless Geology mapping, the site is underlain by Hawkesbury Sandstone which comprises medium to coarse grained quartz sandstone with minor shale and laminite lenses.

According to the NSW Soils Landscape Mapping, the site is located within the Hawkesbury soils landscape, comprising colluvial soils, and in close proximity to the Gymea soil landscape (located immediately to the north of the site), comprising erosional soils. The Hawkesbury soil landscape comprises rugged, rolling to very steep hills; narrow crests and ridges; narrow incised valleys; steep side slopes with rocky benches; broken scarps; boulders; yellow and red podzolic soils associated with

shale lenses; siliceous sands and secondary yellow earths along drainage lines; lithosols / siliceous sands associated with rock outcrops; and earthy sands, yellow earths and some yellow podzolic soils on the inside of benches and along joints and fractures. The Gymea soil landscape comprises undulating to rolling rises and low hills; localised gleyed podzolic soils and yellow podzolic sands on shale lenses, shallow to moderately deep (<100 cm) siliceous sands and leached sands along drainage lines; shallow to moderately deep (30-100 cm) yellow earths and earthy sands on crests and inside of benches; and shallow (<20 cm) siliceous sands on leading edges of benches.

According to NSW Acid Sulfate Soil Risk Mapping, the site is within an area that is not associated with a risk of acid sulfate soils. The nearest area associated with a risk of acid sulfate soils ('disturbed terrain') is approximately 200 m to the south-west of the site.

The majority of rainfall at the site is expected to drain into the local stormwater system. Some rainfall would infiltrate permeable surfaces.

Groundwater at the site is anticipated to flow in a south-west direction, based on topography.

Rushcutters Bay (Sydney Harbour) is located approximately 450 m to the northwest of the site and is considered to be the likely ultimate receiving water body for groundwater from the site as well as stormwater via the local stormwater system.

A search of the Water NSW database for the PSI indicated that there are five registered groundwater bores within 500 m of the site. Bore 'GW026439' (an irrigation bore at Rushcutters Bay Park, approximately 450 m to the north-west) and bore 'GW109375' (an irrigation bore at Trumper Park, approximately 290 m to the south-west) were noted to possibly be hydrogeologically downgradient of the site. Bore 'GW107358' appeared to be hydrogeologically cross-gradient of and not in close proximity to the site. Bores 'GW107539' and GW108791' were located beyond the site's catchment.

6. Previous Reports and Site History

The PSI included a review of historical aerial photographs, NSW EPA public records, Council information, SafeWork NSW records, Google Street View images, photographs of previous internal inspections (provided by client), and the following reports:

- EI Australia Pty Ltd (EI), *Detailed Site Investigation, 136 New South Head Road, Edgecliff*, Reference E24119.E02_Rev1, 15 November 2019, prepared for Edgecliff Prime Pty Ltd; and
- Urbis Pty Ltd (Urbis), *Preliminary Heritage Assessment, 136-148 New South Head Road*, 18 November 2020, prepared for Anka Property Group.

6.1 Site History Summary

A summary of the site history for each property was provided in the PSI as shown in Table 1.

Table 1: Summary of Site History

Property Address	History	Source of Information
136 New South Head Road	A commercial building was likely to be present from circa 1896 and used for professional offices, residences, and a bank prior to its demolition in 1938.	Urbis (2020)
	The current building was constructed in the 1940s for use as a bank. The bank ceased operation in 1990.	Urbis (2020)
	A rear structure, possibly a garage, was demolished and a kitchen was added in the 1940s.	Urbis (2020) and aerial photographs
	Uses of the building since the late 1990s include: offices, a carpet gallery, video rental store, medical centre, photography studio and a residence.	EI (2019), Urbis (2020), site walkover, Google Street View and photographs
138-140 New South Head Road	The current building was constructed in 1919.	Urbis (2020)
	A building application suggests that two garages were present in 1934 and were then removed for a possible shop front.	Council records
	During the 1940s, the building operated as a depot and accommodation for Red Cross workers. Clothing was produced.	Urbis (2020)
	Subsequent use appears to be for residences with modifications made to the flats in the 1970s.	Photographs, Council records and Urbis (2020)
142-146 and 148 New South Head Road	The building was constructed in 1897 and was likely used as professional suites and possible dwellings for medical professionals, perhaps up until the 1980s.	Urbis (2020)
142-146 New South Head Road	The property appears to have been recently used for residential purposes and for office space and has subsequently been vacated.	Site walkover, Google Street View and photographs
148 New South Head Road	The building has been used for dental surgeries and offices since the 1980s.	Council records, photographs and site walkover.
	A likely 'drop-off' for dry cleaning was present in circa 2009 (see comment below).	Site walkover and Google Street View

Although XL Dry Cleaners were tenants at 148 New South Head Road in circa 2009, it was considered that, given the absence of Council records and SafeWork NSW records pertaining to dry cleaning operations as well as the general lack of substantial floor space within the building, XL Dry Cleaners likely used the property as a 'drop-off' location for dry cleaning rather than for undertaking dry cleaning on-site.

Based on aerial photographs and observations, nearby surrounding properties have likely been used for a mix of commercial and residential purposes since at least the 1940s.

6.2 Previous Intrusive Investigation

EI (2019) was prepared for a development application for a proposed commercial building at the property at 136 New South Head Road (Lot 1 in Deposited Plan 663495). Six boreholes (BH1 to BH6) were drilled at 136 New South Head Road in February 2019. Asphalt or concrete was underlain by silty sand or sand fill to a maximum depth of 0.3 m. Fill was underlain by sandy clay / clayey sand to a maximum depth of 2 m and then sandstone, encountered to a depth of 13 m at BH6. BH1 and BH6 were converted to 9 m deep groundwater monitoring wells. The water level was measured to be 3.81 m and 4.27 m below the top of well casing, respectively. Based on the water levels, groundwater flow was inferred to be in a south-west direction.

Selected soil samples were analysed for TRH, BTEX, PAH, OCP, OPP, eight priority metals and asbestos. Concentrations of contaminants were compared to criteria for a commercial site from NEPC (2013). Concentrations of TRH and PAH were identified above the adopted assessment criteria in fill samples. OCP were identified in one fill sample, but at concentrations within the assessment criteria.

Samples of groundwater were analysed for eight priority metals, TRH, BTEX, PAH and VOC. TRH and PAH were detected above the laboratory practical quantitation limit (at low concentrations) in samples from each well. Some metals were also detected but were considered by EI to be at concentrations consistent with background conditions for urban (Sydney metropolitan) areas.

It is noted that EI (2019) was prepared for a different client and for a different project, so the report has been used for background information purposes and, hence, the field and analytical data from EI (2019) has not been used in this assessment.

6.3 Preliminary Conceptual Site Model and Potential Contaminants

A conceptual site model is a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The preliminary conceptual site model summary from the PSI is shown in Table 2.

Table 2: Preliminary Conceptual Site Model

Source and COPC	Transport Pathway	Receptor
S1: Imported fill to form or level the site S3: Possible chemical use associated with previous commercial activities	P1: Ingestion and dermal contact P2: Inhalation of dust P3: Inhalation of vapours	R1: Future site users (residents, visitors, workers and customers) R2: Construction workers for the proposed development R3: Intrusive maintenance workers (post-development)
	P2: Inhalation of dust P3: Inhalation of vapours	R4: Adjacent site users (residents, pedestrians, workers, etc.)
	P4: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater P6: Lateral migration of groundwater providing base flow to water bodies	R5: Surface water (Rushcutters Bay)
	P5: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater
	P7: Contact with terrestrial ecology	R7: Terrestrial ecology
	P8: Contact with building structures	R8: In ground structures
S2: Hazardous building materials from current and previous structures	P1: Ingestion and dermal contact P2: Inhalation of dust	R1: Future site users (residents, visitors, workers and customers) R2: Construction workers for the proposed development R3: Intrusive maintenance workers (post-development)
	P2: Inhalation of dust	R4: Adjacent site users (residents, pedestrians, workers, etc.)
	P4: Surface water run-off P5: Leaching of contaminants and vertical migration into groundwater P6: Lateral migration of groundwater providing base flow to water bodies	R5: Surface water (Rushcutters Bay)

Contaminants of potential concern (COPC) were listed in the PSI to include metals, TRH, BTEX, VOC, PAH, PCB, OCP, OPP, phenols asbestos.

7. Sampling and Analysis Quality Plan

7.1 Quality Assurance and Quality Control

The DSI was devised with reference to the seven-step data quality objective process which is provided in Appendix B Schedule B2, NEPC (2013). The results of field QA / QC procedures as well as a discussion of data quality objectives (DQO) and data quality indicators (DQI) for the assessment are provided in Appendix F.

The analytical laboratories, accredited by NATA, are required to conduct in-house QA / QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory certificates in Appendix G and results are discussed in Appendix F.

7.2 Soil Sampling Rationale and Method

Soil sampling was limited to external areas where intrusive works were permitted. It is noted that intrusive works were not permitted at 148 New South Head Road (Lot B, Deposited Plan 443992).

According to EPA*, Sampling Design Guidelines*, 1995, a minimum of seven systematic sampling points is recommended to characterise a site covering 0.2 ha. The current investigation included soil sampling from seven locations (BH1 to BH7), however, these were positioned where intrusive works were permitted rather than on a systematic sampling pattern. BH1 and BH2 were primarily positioned for geotechnical purposes. BH5 to BH7 were positioned at the car park where elevated concentrations of TRH and PAH were recorded in EI (2019). BH3 and BH4 were positioned to provide some general site coverage, where accessible.

A concrete corer was used to core through the pavement at each sample location.

BH1 and BH2 were drilled using an underpinner rig (a hand-assembled rig) with auger and rock coring attachments. BH3 to BH7 were drilled using a hand auger.

All sampling data was recorded on DP's borehole logs provided in Appendix C. The general sampling procedure adopted for the collection of soil samples for chemical analysis was:

- Collect soil samples directly from the auger using disposable gloves (replaced between the collection of each sample);
- Transfer samples into laboratory-prepared glass jars with Teflon lined lids, filled to minimise the headspace within the sample jar, and capping immediately to minimise loss of volatiles;
- Label sample containers with individual and unique identification, including project number, sample location and sample depth; and
- Place the glass jars into a cooled, insulated and sealed container for transport to the laboratory with chain-of-custody documentation.

Replicate samples were collected in zip-lock bags for screening of VOC using a calibrated PID.

7.3 Groundwater Sampling Rationale and Method

In order to assess the groundwater contamination status at the site and evaluate whether previous site uses or off-site land may have impacted groundwater, sampling from the two existing (previously installed - EI (2019)) monitoring wells (BH1M and BH6M) was undertaken.

BH6M was purged on 2 February 2021 and BH1M was purged on 3 February 2021 using a pump. Groundwater sampling from each of these wells was undertaken on 5 February 2021. Prior to purging and prior to groundwater sample collection, an interface dip-meter was used to measure the groundwater level and check for light non-aqueous phase liquids (LNAPL). The dip-meter was decontaminated following use at each well using a 3% solution of phosphate free detergent (Decon 90) and distilled water.

Groundwater sampling was undertaken using a low-flow geo-pump (peristaltic pump) and disposable tubing, following stabilisation (or near stabilisation) of field parameters. Field parameters were obtained using a calibrated water quality meter with probes placed inside a flow-through cell. The field parameters included temperature, dissolved oxygen (DO), electrical conductivity (EC), pH, oxidation reduction potential (redox) and turbidity. Disposable sampling equipment (tubing) was used between collection of samples to avoid the need for decontamination. Samples were collected from depths which corresponded with the approximate mid-point of the well screen.

Samples were collected in laboratory prepared bottles and vials. The groundwater samples collected for metals testing were filtered in the field through a 45 µm membrane filter into nitric acid preserved bottles. Sample containers were labelled with individual and unique identification, including project number and sample number. Samples were placed in cooled, insulated and sealed containers for transport to the laboratory.

Groundwater field sheets were used to record groundwater depths, sample depths, field parameters, observations and samples collected. The groundwater field sheets are provided in Appendix D.

7.4 Analytical Rationale

For soil, fill samples from each location (BH1 to BH7) were subject to laboratory analysis as fill of unknown origin was considered to be a likely source of contamination. At least one fill sample from each borehole was analysed for a large suite of COPC (eight priority metals, TRH, BTEX, PAH, total phenols, OCP, OPP, PCB and asbestos) to provide data for all sampled areas. Additional fill samples were analysed for a shorter suite of COPC (eight priority metals, TRH, BTEX and PAH) to provide additional data for the observed vertical fill profile. One natural soil sample was analysed for the shorter suite of contaminants to provide data for natural soil underlying fill. Two fill samples were analysed for pH and CEC for calculation of ecological site assessment criteria. A replicate fill sample was designated for analysis for eight priority metals, TRH and BTEX for QA / QC purposes.

Lead in TCLP and PAH in TCLP analysis was undertaken on fill samples with elevated lead and/or PAH concentrations to provide waste classification data.

A groundwater sample from each existing monitoring well (BH1M and BH6M) was designated for laboratory analysis for a large suite of COPC (eight priority, metals, TRH, BTEX, PAH, speciated phenols, OCP, OPP, PCB and VOC) to obtain data for these two locations. Water hardness was also tested in each primary sample. A replicate groundwater sample was designated for analysis for eight priority metals, TRH and BTEX for QA / QC purposes.

8. Site Assessment Criteria

The Site Assessment Criteria (SAC) for COPC tested in the current investigation are discussed below. The SAC was informed by the preliminary conceptual site model (see Section 6.3) and proposed development.

8.1 Soil

Investigation levels, screening levels and management limits for soils have been primarily sourced from Schedule B1 of NEPC (2013). It is noted that investigation levels, screening levels and management limits are not intended to be used as clean up levels. They establish concentrations above which further appropriate investigation (e.g., Tier 2) could be undertaken. The SAC for soils are discussed in the following subsections.

8.1.1 Health Investigation Levels

Given the proposed land use includes residential apartments, health investigation levels (HIL) for residential land use with minimal opportunities for soil access have been adopted as SAC from Schedule B1 of NEPC (2013). HIL are shown in Table 2. HIL are applicable to assessing health risk arising via all relevant pathways of exposure for a range of metals and organic substances.

Table 2: Health Investigation Levels (HILs)

Contaminant		HIL B - Residential (mg/kg)
Metals and Inorganics	Arsenic	500
	Cadmium	150
	Chromium (VI)	500
	Copper	30,000
	Lead	1,200
	Mercury (inorganic)	120
	Nickel	1,200
	Zinc	60,000
PAH	Benzo(a)pyrene TEQ[1]	4
	Total PAH	400
Phenols	Phenol	45,000
	Pentachlorophenol	130

Contaminant		HIL B - Residential (mg/kg)
	Cresols	4700
OCP	DDT +DDD +DDE	600
	Aldrin + Dieldrin	10
	Chlordane	90
	Endosulfan	400
	Endrin	20
	Heptachlor	10
	HCB	15
	Methoxychlor	500
Other pesticides	Chlorpyrifos	340
	Bifenthrin	840
PCB	PCB[2]	1

Notes:

1 sum of carcinogenic PAH for detections above laboratory PQL only

2 non dioxin-like PCB only

8.1.2 Health Screening Levels for Vapour Intrusion

Health Screening Levels (HSL) for vapour intrusion are used to assess selected petroleum compounds and fractions to assess the risk to human health via the vapour inhalation exposure pathway. Given that the basement levels will be used for car parking and the ground floor will be used for commercial purposes, HSL for a commercial / industrial land use have been adopted as SAC from Schedule B1 of NEPC (2013). Table 3 shows the HSL. The HSL are for sand (the dominant soil type at the site) and for a depth of contamination of 0 m to <1 m. Other HSL may be applicable where there is a different soil type, or the depth of contamination is greater.

Table 3: Health Screening Levels (HSLs) for Vapour Intrusion

Contaminant		HSL D Sand, depth 0 to <1 m (mg/kg)
TPH	C_6 - C_{10} (less BTEX)	260
	$>C_{10}$-C_{16} (less Naphthalene)	NL
BTEX	Benzene	3
	Toluene	NL
	Ethyl Benzene	NL
	Xylenes	230
PAH	Naphthalene	NL

Notes: 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 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'.

8.1.3 Ecological Investigation Levels

Ecological Investigation Levels (EIL) have been developed and discussed in NEPC (2013) for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems. EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which essentially corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant using the following formula:

EIL = ABC + ACL, where

ABC = Ambient Background Concentration
ACL = Added Contaminant Limit

The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g., motor vehicle emissions). ACLs are based on the soil characteristics such as pH, CEC and clay content.

EIL (and ACL where appropriate) were derived in NEPC (2013) for only a short list of contaminants including arsenic, copper, chromium (III), DDT, naphthalene, nickel, lead and zinc. The adopted EIL, shown in Table 4, were derived using *Ecological Investigation Level Calculation Spreadsheet* (downloaded from the ASC NEPM Toolbox website) developed by CSIRO for NEPC and are based on the following:

- A protection level of 80% (urban residential and public open space setting) has been adopted given the low exposure scenario;
- Given the likely source of soil contaminants (i.e., fill, historical spills, etc.), the contamination is considered as “aged” (>2 years);
- The site in an area of high traffic volume;
- ABC for lead has been sourced from Table 67 of Schedule B5c of NEPC (2013);
- An organic carbon content of 1% has been used as a (conservative) default input value;
- A clay content of 1% has been used as a (conservative) input value given that the soil profile at the site is mainly sand;
- A pH of 7.65 has been used as an input value as this is the average pH obtained from laboratory testing (the sample from BH3, 0.2-0.3 m, had a pH of 7.8 and the sample from BH7, 0.4-0.5 m, had a pH of 7.5); and
- A CEC input value of 3.05 meq/100g has been used as this is the average CEC obtained from the laboratory testing (the sample from BH3, 0.2-0.3 m, had a CEC of 1.2 meq/100g and the sample from BH7, 0.4-0.5 m, had a CEC of 4.9 meq/100g).

Table 4: Ecological Investigation Levels (EIL)

Contaminant		EIL (mg/kg)
Metals	Arsenic	100
	Chromium (III)	200
	Copper	85
	Lead	1260
	Nickel	15
	Zinc	280
PAH	Naphthalene	170
OCP	DDT	180

It is noted that EIL will not be applied in areas which have very limited ecological value such as for soil directly beneath concrete floor slabs and, therefore, exceedances of the EIL may not trigger the need for remediation or management.

8.1.4 Ecological Screening Levels (ESL)

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile which essentially corresponds to the root zone and habitation zone of many species.

The adopted ESL, from Schedule B1 of NEPC (2013), are shown in Table 5. The following site-specific data and assumptions have been used to determine the ESL:

- The generic ESL for urban residential and public open space apply given the proposed residential land use; and
- A “coarse” soil texture has been adopted given that the predominant soil type is sand.

Table 5: Ecological Screening Levels (ESL)

Analyte		ESL (mg/kg)
TPH	$C_6 – C_{10}$ (less BTEX)	180*
	$>C_{10}-C_{16}$	120*
	$>C_{16}-C_{34}$	300
	$>C_{34}-C_{40}$	2800
BTEX	Benzene	50
	Toluene	85
	Ethyl Benzene	70
	Xylenes	105
PAH	Benzo(a)pyrene	0.7

Notes: All ESLs are low reliability apart from those marked with * which are moderate reliability

It is noted that ESL will not be applied in areas which have very limited ecological value such as for soil beneath concrete floor slabs and, therefore, exceedances of the ESL may not trigger the need for remediation or management.

8.1.5 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; and
- Effects on buried infrastructure e.g., penetration of, or damage to, in-ground services.

Management Limits to avoid or minimise these potential effects have been provided in Table 1B (7) in NEPC (2013) as interim Tier 1 guidance. Management limits typically apply to any depth within the soil profile. The adopted Management Limits are shown in Table 6 and are:

- The generic Management Limits for urban residential and public open space given the proposed residential land use; and
- For 'coarse' soils given the predominant sand soil type.

Table 6: Management Limits

Contaminant		Management Limit (mg/kg)
TPH	$C_6 – C_{10}$	700
	$>C_{10}-C_{16}$	1000
	$>C_{16}-C_{34}$	2500
	$>C_{34}-C_{40}$	10 000

8.1.6 Asbestos

Based on the CSM and/or current site access limitations, a detailed asbestos assessment was not considered to be warranted at this stage. However, due to the history of widespread use of ACM products across Australia, ACM can be encountered unexpectedly and sporadically at a site. Therefore, the presence or absence of asbestos at a limit of reporting of 0.1 g/kg (AS:4964) has been adopted for this investigation / assessment as an initial screen.

8.1.7 Health Screening Levels for Direct Contact

With respect to the risk to human health via the direct contact with soil pathway, direct contact HSL have been adopted from CRC Care, *Technical report no. 10, Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 1: Technical development document*, 2011 (CRC Care, 2011). HSL for high density residential use have been adopted as SAC and are shown in Table 7. It is noted that HSL B (high density residential) are more conservative than HSL for a commercial land use or for intrusive maintenance workers.

Table 7: Health Screening Levels (HSLs) for Direct Contact

Contaminant		HSL – B Residential (mg/kg)
TPH	$C_6 – C_{10}$	5600
	$>C_{10}-C_{16}$	4200
	$>C_{16}-C_{34}$	5800
	$>C_{34}-C_{40}$	8100
BTEX	Benzene	140
	Toluene	21,000
	Ethyl Benzene	5900
	Xylenes	17,000
PAH	Naphthalene	2200

8.2 Groundwater

The assessment criteria used for contamination in groundwater are based on the potential uses or risks posed by contaminated groundwater at or down-gradient of the site. The adopted SAC for groundwater are listed in the following sub-sections.

8.2.1 Default Guideline Values

For the protection of the nearest receiving water body, Botany Bay which is a marine water ecosystem, marine default guideline values (DGV) recommended for a slightly to moderately disturbed ecosystem or, otherwise, an unknown level of species protection from the Australian and New Zealand Governments (ANZG), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* website have been adopted. The DGV are shown in Table 8.

Table 8: Default Guideline Values

Contaminant		Marine Water DGV (µg/L)
Metals	Cadmium	0.7
	Chromium (III)	27
	Chromium (VI)	4.4
	Copper	1.3
	Lead	4.4
	Mercury	0.1
	Nickel	7
	Zinc	15
PAH	Anthracene	0.01
	Naphthalene	50
	Fluoranthene	1
	Benzo(a)pyrene	0.1
	Phenanthrene	0.6
BTEX & VOC	Benzene	500
	Toluene	180
	Ethylbenzene	80
	m-xylene	75

Contaminant		Marine Water DGV (µg/L)
	o-xylene	350*
	p-xylene	200*
	Isopropylbenzene (Cumene)	30
	Tetrachloroethene	70
	Trichloroethene	330
	1,1-Dichloroethene	700
	Chloroethene (vinyl chloride)	100
	1,2,4-Trichlorobenzene	20
	1,2-Dichlorobenzene	160*
	1,3-Dichlorobenzene	260*
	1,4-Dichlorobenzene	60*
	1,1,2,2-Tetrachloroethane	400
	1,1,1-Trichloroethane	270
	1,1,2-Trichloroethane	1900
	1,2-Dichloroethane	1900
	Carbon tetrachloride	240
	Chloroform	370
	1,2-Dichloropropane	900
	1,3-Dichloropropane	1100
	Monochlorobenzene (chlorobenzene)	55
OCP	Aldrin	0.003
	Chlordane	0.001
	DDT	0.0004
	Dieldrin	0.01*
	Endosulfan	0.005
	Endrin	0.004
	Heptachlor	0.0004
	Methoxychlor	0.004
OPP	Azinphos methyl	0.01*
	Chlorpyrifos	0.009
	Diazinon	0.01*
	Dimethoate	0.15*
	Fenitrothion	0.001
	Malathion	0.05*
	Parathion	0.004
PCB	Aroclor 1242	0.3*
	Aroclor 1254	0.01*
Phenols	Phenol	400
	2,4,6-Trichlorophenol	3*
	2,4-Dinitrophenol	45*
	4-Nitrophenol	58*
	2,3,4,6-Tetrachlorophenol	10*
	Pentachlorophenol	11
	2-Chlorophenol	340*
	2,4-Dimethylphenol	2*
	2,4-Dichlorophenol	120*
	2,6-Dichlorophenol	34*

Notes: * Freshwater DGV adopted and to be used with caution (as stated in the guideline).

8.2.2 Guidelines for Recreational Waters

The National Health and Medical Research Council (NHMRC), *Guidelines for Managing Risks in Recreational Water*, 2008 adopts drinking water guideline values for managing risks in recreational waters. It is stated, however, that guideline values applicable for drinking water quality are based on a daily consumption of 2 L and when applying these values to recreational water exposure, consumption of 0.1 to 0.2 L per day should be taken into consideration. The adopted guidelines for the protection of recreational water shown in Table 9 are sourced from the National Health and Medical Research Council and National Resource Management Ministerial Council (NHMRC & NRMMC), *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy*, 2011, updated August 2018, with health-based drinking water guideline values multiplied by 10 to account for consumption for recreational water exposure.

Table 9: Guidelines for Managing Risks to Users of Recreational Waters

Contaminant		Recreational Water Guideline (µg/L)	
		Health	Aesthetic
Metals	Arsenic (total)	100	-
	Cadmium	20	-
	Chromium (VI)	500	-
	Copper	20 000	1000
	Lead	100	-
	Mercury	10	-
	Nickel	200	-
	Zinc	-	3000
PAH	Benzo(a)pyrene	0.1	-
BTEX & VOC	Benzene	10	-
	Toluene	8000	25
	Ethylbenzene	3000	3
	Xylene (total)	6000	20
	Tetrachloroethene	500	-
	1,1-Dichloroethene	300	-
	1,2-Dichloroethene	600	-
	1,3-Dichloropropene	1000	-
	Chloroethene (vinyl chloride)	3	-
	Chlorobenzene	3000	10
	Trichlorobenzenes (total)	300	5
	1,2-Dichlorobenzene	15 000	1
	1,3-Dichlorobenzene	-	20
	1,4-Dichlorobenzene	400	0.3
	1,2-Dichloroethane	30	-
	Carbon tetrachloride	30	-
	Trihalomethanes (total)	2500	-
	Styrene	300	4
	Hexachlorobutadiene	7	-
OCP	Chlordane	20	-
	DDT	90	-
	Aldrin & Dieldrin (combined)	3	-
	Endosulfan	200	-
	Heptachlor & Heptachlor Epoxide	3	-
	Methoxychlor	3000	-
OPP	Azinphos methyl	300	-
	Chlorpyrifos	100	-
	Diazinon	40	-
	Dichlorovos	50	-

Contaminant		Recreational Water Guideline (µg/L)	
		Health	Aesthetic
	Dimethoate	70	-
	Fenitrothion	70	-
	Malathion	700	-
	Parathion	200	-
	Methyl parathion	7	-
	Bromophos ethyl	100	-
	Ethion	40	-
Phenols	2-Chlorophenol	3000	0.1
	2,4-Dichlorophenol	2000	0.3
	2,4,6-Trichlorophenol	200	2
	Pentachlorophenol	100	-

Notes * Trihalomethanes includes chloroform, bromodichloromethane, chlorodibromomethane and bromoform

Given that groundwater migrating from the site may be used for irrigation purposes at parks located to the south west of the site, the guidelines presented in Table 9 are considered to be applicable for the protection of human health from the use of irrigation water at parks. It is noted that these guidelines are considered to be very conservative, given that human contact with irrigation water at parks is considered to be minimal when compared to human contact at recreational workers where swimming is permitted.

8.2.3 Health Screening Levels for Vapour Intrusion

The generic HSL for vapour intrusion from Schedule B1 of NEPC (2013) are for groundwater that is at least 2 m below the ground floor or basement slab. Therefore, the generic HSL do not apply to the proposed tower, as groundwater will be in contact with the basement.

In the absence of generic HSL, the laboratory practical quantitation limits will be used as initial screening criteria for naphthalene, BTEX, TRH C_6-C_{10}, TRH >C_{10}-C_{16} and any other VOC.

9. Results

9.1 Field Work Results

The borehole logs for this assessment are included in Appendix C and should be reference for detailed soil and rock descriptions.

For boreholes drilled at the car park at 136 New South Head Road (BH5, BH6 and BH7), asphaltic concrete (0.01 m to 0.04 m thick) was underlain by yellow, red and grey sand fill or brown and black gravelly sand fill (igneous gravel) to depth of between 0.4 m and 0.6 m where refusal was encountered on inferred sandstone. Traces of sandstone, asphaltic concrete and clay were encountered in the fill. It is noted that the soil descriptions are somewhat different to those for bores drilled at this area in EI (2019).

At BH2, drilled at the lower portion of 136 New South Head Road, a concrete slab (50 mm thick) was underlain by grey to brown sand fill to a depth of 0.6 m. The fill also contained ripped sandstone gravels and cobbles. Fill was underlain by grey and brown sandstone to a depth of 15 m. It is noted that the soil descriptions are somewhat different to those for the bore drilled at this area in EI (2019).

At BH4, drilled at the rear of 138-140 New South Head Road, a brick pavement (0.07 m thick) was underlain by brown and orange sand fill with trace sandstone and igneous gravel to a depth of 0.6 m. Yellow and red sand with trace sandstone gravel was encountered from a depth of 0.6 m to 0.7 m. Drilling refusal, on inferred sandstone, was encountered at a depth of 0.7 m.

For boreholes drilled at 142-146 New South Head Road (BH1 and BH3), pavers (40 mm thick at BH1) and a terracotta pavement (0.18 m thick at BH3) was underlain by brown and grey sand fill to depths of 0.6 m and 1.3 m. Ripped sandstone gravels and trace igneous gravels were observed in the sand fill. Fill was underlain by brown and yellow sand to a depth of 1.8 m at BH3 (i.e., the borehole target depth) and to a depth of 2.4 m at BH1. Grey and brown sandstone was encountered from a depth of 2.4 m to a depth of 18.82 m.

PID results for samples from BH3 to BH7 were all less than 1 ppm, indicating a low potential for the presence of volatile contaminants. (The PID was not used on samples from BH1 and BH2). No odours were noted during sampling.

Potential asbestos-containing materials were not observed whilst sampling. It is noted, however, that the implementation of boreholes allows only for observing a very small volume of soil, and, therefore, the presence of asbestos in fill cannot be ruled out by the observations made in this investigation.

No free groundwater was observed during drilling of boreholes. It is noted, however, that the rock coring technique adopted at BH1 and BH2 does not allow for making groundwater observations.

Groundwater field sheets are provided in Appendix D. Measured water levels prior to purging and prior to sampling are summarised in Table 10. No phase separated hydrocarbons were noted from use of the dip-meter. It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

Table 10: Summary of Groundwater Level Measurements

Well ID (EI, 2019)	Ground Level (m AHD)	Groundwater Depth Prior to Purge 2-3 / 2 / 2021 (m bgl)	Groundwater Level Prior to Purge 2-3 / 2 / 2021 (m AHD)	Groundwater Depth Prior to Sampling 5 / 2 / 2021 (m bgl)	Groundwater Level Prior to Sampling 5 / 2 / 2021 (m AHD)
BH1M	32.8	2.92	29.9	4.15	28.7
BH6M	32.8	3.99	28.8	3.75	29.1

Notes:
AHD – Australian Height Datum
bgl – below ground level

For purging, approximately 20 L of turbid groundwater was removed from BH1M and approximately 15 L of brown and turbid groundwater was removed from BH6M. Each well was purged dry. No signs of contamination (odours or oil sheen) were observed whilst purging.

Sampled groundwater was observed to be grey and have slight to moderate turbidity. No signs of contamination (odours or oil sheen) were observed whilst sampling.

9.2 Laboratory Analytical Results

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

- Table E1: Summary of Laboratory Results of Soil Contaminants;
- Table E2: Summary of Results of Groundwater Analysis; and
- Table E3: Summary of Laboratory Results for Waste Classification.

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

10. Discussion

10.1 Soil Contamination

10.1.1 Metals

Concentrations of metals (arsenic, cadmium, chromium, lead, mercury, nickel and zinc) were within the HIL for all analysed samples.

Concentrations of arsenic, chromium, lead and zinc were within the EIL.

Concentrations of copper were within EIL (85 mg/kg) except for the sample from BH7, depth 0.05-0.15 m and the laboratory replicate sample, which had recorded copper concentrations of 120 mg/kg and 130 mg/kg.

Concentrations of nickel were within the EIL (15 mg/kg) except for the laboratory triplicate sample from BH7, depth 0.05-0.15 m, which had a nickel concentration of 16 mg/kg. The primary analysis of this sample had a recorded nickel concentration of 14 mg/kg. It is noted that the average of these two results (15 mg/kg) is equal to the EIL.

The slightly elevated concentrations of copper and nickel noted above are considered to be associated with the fill. It is noted that the exceedances of the EIL are of minor significance to the proposed development, given that the development will result in the site having little ecological value.

It is noted that concentrations of metals were similar to those recorded in EI (2019).

10.1.2 TRH and BTEX

Concentrations of TRH and BTEX were within the HSL for vapour intrusion and HSL for direct contact except for the sample from BH7, depth 0.05-0.15 m. For this sample, the concentration of TRH >C_{16}-C_{34} (7500 mg/kg) exceeded the HSL for direct contact (5800 mg/kg).

Concentrations of TRH and BTEX were within the ESL except for:

- TRH >C_{10}-C_{16} (280 mg/kg) and TRH >C_{16}-C_{34} (7500 mg/kg) in the sample from BH7, depth 0.05-0.15 m;
- TRH >C_{16}-C_{34} (2400 mg/kg) in the sample from BH1, depth 0.5-0.6 m;
- TRH >C_{16}-C_{34} (2300 mg/kg) in the sample from BH2, depth 0.1-0.2 m;
- TRH >C_{16}-C_{34} (1500 mg/kg) in the sample from BH5, depth 0.05-0.15 m; and
- TRH >C_{16}-C_{34} (830 mg/kg) in the sample from BH5, depth 0.3-0.4 m.

It is noted that the exceedances of the ESL are not considered to be of significance to the proposed development, given that the development will result in the site having little ecological value.

Given the absence of odours and from a review of the TRH chromatograms, it is considered that the elevated concentrations of TRH are sourced from a component of the fill, rather than a petroleum product (eg petrol or diesel).

Concentrations of TRH were within the management limits except for the sample from BH7, depth 0.05-0.15 m. For this sample, the concentration of TRH >C_{16}-C_{34} (7500 mg/kg) exceeded the management limit of 2500 mg/kg. It is noted, however, that the TRH is not considered to be from a petroleum product such as petrol or diesel and, therefore, the material represented by this samples is not considered to pose potential effects of formation of LNAPL, fire and explosion hazard, or damage to buried services.

It is noted that concentrations of TRH and BTEX were similar to those recorded in EI (2019).

10.1.3 PAH

Concentrations of total PAH and / or benzo(a)pyrene TEQ exceeded the HIL (400 mg/kg and 4 mg/kg, respectively) in the following samples from:

- BH1, depth 0.5-0.6 m (total PAH: 620 mg/kg, benzo(a)pyrene TEQ: 93 mg/kg);
- BH2, depth 0.1-0.2 m (benzo(a)pyrene TEQ: 46 mg/kg);
- BH5, depth 0.05-0.15 m (benzo(a)pyrene TEQ: 30 mg/kg) and depth 0.3-0.4 m (benzo(a)pyrene TEQ: 24 mg/kg); and
- BH7, depth 0.05-0.15 m (total PAH: 1700 mg/kg, benzo(a)pyrene TEQ: 220 mg/kg).

The elevated concentrations of PAH are considered to be associated with the fill.

Concentrations of benzo(a)pyrene also exceeded the ESL (0.7 mg/kg) in the following samples:

- BH1, depth 0.5-0.6 m (benzo(a)pyrene: 67 mg/kg);
- BH2, depth 0.1-0.2 m (benzo(a)pyrene: 33 mg/kg);

- BH5, depth 0.05-0.15 m (benzo(a)pyrene: 21 mg/kg) and depth 0.3-0.4 m (benzo(a)pyrene: 17 mg/kg); and
- BH7, depth 0.05-0.15 m (benzo(a)pyrene: 130 mg/kg) and depth 0.4-0.5 m (benzo(a)pyrene: 1.4 mg/kg).

It is noted that the exceedances of the ESL are not considered to be of significance to the proposed development, given that the development will result in the site having little ecological value.

Concentrations of naphthalene were within the HSL for vapour intrusion, HSL for direct contact and EIL.

It is noted that concentrations of PAH were similar to those recorded in EI (2019).

10.1.4 OCP, OPP, PCB and Phenols

Concentrations of OCP, OPP, PCB and total phenols were less than the PQL for all analysed samples. Therefore, concentrations of OCP were within the HIL and EIL (for DDT) and concentrations of OPP, PCB, phenols were within the HIL.

It is noted that concentrations of OPP and PCB and were similar to those recorded in EI (2019), however, OCP was detected in one sample in EI (2019).

10.1.5 Asbestos

Asbestos was not detected in analysed soil samples.

It is noted that asbestos was not detected in samples for EI (2019).

10.2 Groundwater

10.2.1 Metals

Concentrations of arsenic were less than the laboratory practical quantitation limit and, hence, within the recreational water guideline. Concentrations of chromium and mercury were less than the laboratory practical quantitation limits and, therefore, within the DGV and recreational water guidelines. Concentrations of cadmium were within the DGV and recreational water guideline.

Concentrations of copper, ranging from 2 µg/L to 80 µg/L, were above the DGV (1.3 µg/L) in all analysed samples. Concentrations of copper were within the recreational water guidelines.

Concentrations of lead were within the DGV (4.4 µg/L) except in the sample from BH6M (17 µg/L). Lead concentrations were within the recreational water guideline.

Concentrations of nickel were within the DGV (7 µg/L) except in the sample from BH6M (13 µg/L). Nickel concentrations were within the recreational water guideline.

Concentrations of zinc were above the DGV (15 µg/L) in the primary sample from BH1M (37 µg/L) and the sample from BH6M (190 µg/L). Zinc concentrations were within the recreational water guideline.

Despite the exceedances of the DGV for copper, lead, nickel and zinc noted above, concentrations of metals are, based on our experience, considered to be within typical background ranges in the Sydney region and not indicative of contamination.

Concentrations of metals were not dissimilar to those recorded in EI (2019).

10.2.2 TRH, BTEX and VOC

Concentrations of TRH were less than the laboratory practical quantitation limits. Concentrations of BTEX and VOC were less than the laboratory practical quantitation limits and, hence, within the respective DGV and recreational water guidelines.

It is noted that BTEX and VOC results were similar to those recorded in EI (2019), however, low concentrations of TRH were recorded in EI (2019).

10.2.3 PAH

Concentrations of PAH (including naphthalene) were less than the laboratory practical quantitation limits and, hence, within the respective DGV and recreational water guidelines.

It is noted that, unlike in the current investigation results, PAH was detected at a low concentration in one sample in EI (2019).

10.2.4 OCP, OPP, PCB and Phenols

OPP, PCB and speciated phenols concentrations were less than the laboratory practical quantitation limits, and, hence within the respective DGV and recreational water guidelines.

Concentrations of OCP were less than the laboratory practical quantitation limits except for dieldrin and heptachlor epoxide in the sample from BH1M. The concentration of dieldrin (0.073 µg/L) in this sample exceeds the DGV (0.01 µg/L). It is noted that there is no DGV (or other Australian ecological guideline) for heptachlor epoxide. It is noted that the concentration of heptachlor epoxide for the sample from BH1M (0.009 µg/L) is well within the Dutch Soil Remediation Circular 2009 groundwater intervention value of 3 µg/L (which accounts for the ecological risk of the contaminant). All OCP concentrations were within the recreational water guidelines.

Given that the recorded dieldrin concentration is of the same order of magnitude as the DGV and the likely receiving water body (Rushcutters Bay) is not in close proximity of the site, it is considered unlikely that the dieldrin in groundwater presents an ecological risk to marine ecology.

It is noted that dieldrin was not detected in the analysed soil samples for this investigation and a low concentration of dieldrin was recorded in one soil sample in EI (2019) which suggests that the dieldrin in groundwater may be sourced from off-site. It is noted that heptachlor epoxide (and heptachlor) was not detected in the analysed soil samples at the site, so the heptachlor epoxide in groundwater may too be sourced from off-site.

10.3 Preliminary Waste Classification Comments

For fill samples, concentrations of contaminants were within the CT1 criteria for General Solid Waste from NSW EPA, *Waste Classification Guidelines*, 2014 except for:

- Lead concentrations in samples collected from BH1 (depth 0.5-0.6 m), BH2 (depth 0.1-0.2 m), BH3 (depth 0.2-0.3 m) and BH5 (depth 0.05-0.15 m);
- Total PAH concentrations in samples collected from BH1 (depth 0.5-0.6 m), BH2 (depth 0.1-0.2 m) and BH7 (depth 0.05-0.15 m); and
- Benzo(a)pyrene concentrations in samples from BH1 (depth 0.5-0.6 m), BH2 (depth 0.1-0.2 m), BH5 (depths 0.05-0.15 m and 0.3-0.4 m) and BH7 (depths 0.05-0.15 m and 0.4-0.5 m).

Lead and / or PAH in TCLP analysis was undertaken on the above listed samples. Concentrations of lead were within the SCC1 and TCLP1 criteria General Solid Waste, however, concentrations of total PAH and / or benzo(a)pyrene were not within the SCC1 and TCLP1 in five samples including:

- Samples from BH1 (depth 0.5-0.6 m), BH2 (depth 0.1-0.2 m) and BH7 (depth 0.05-0.15 m) which had benzo(a)pyrene and / or total PAH concentrations above the SCC2 and TCLP2 criteria for Restricted Solid Waste, and, therefore, these samples have benzo(a)pyrene and / or total PAH that are at Hazardous Waste concentrations; and
- Samples from BH5 (depths 0.05-0.15 m and 0.3-0.4 m) which had concentrations of total PAH and benzo(a)pyrene within the SCC2 and TCLP2 criteria for Restricted Solid Waste (i.e., at Restricted Waste concentrations).

Given the variable concentrations of PAH and (to a lesser extent) lead, it is recommended that additional testing be undertaken at the time of excavation in order to segregate fill materials into Hazardous Waste, Restricted Solid Waste and General Solid Waste streams for off-site disposal. In addition, fill material will be classified as Special Waste if asbestos contamination is revealed during excavation.

Concentrations of metals, TRH, BTEX and PAH for the natural soil sample from BH3 (depth 1.5-1.6 m) are at concentrations consistent with Virgin Excavated Natural Material (VENM) as defined in the *Protection of the Environment Operations Act 1997* (POEO Act). Given the presence of contaminants in overlying fill, it is recommended that, at the time of excavation, sampling and testing be undertaken following fill removal to determine/confirm the VENM status of the natural soil and bedrock for off-site disposal.

10.4 Data Quality Assurance and Quality Control

The data quality assurance and quality control (QA / QC) results are included in Appendix F. 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.

11. 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 shown in Table 11 has been modified from the PSI based on the results of this investigation.

Table 11: Summary of Potentially Complete Exposure Pathways for Identified Contamination

Source	Transport Pathway	Receptor
Imported fill used to form or level the site (containing PAH and TRH)	• Ingestion and dermal contact • Inhalation of dust	• Future site users (residents, visitors, workers and customers) • Construction workers for the proposed development • Intrusive maintenance workers (post-development)
	• Inhalation of dust	• Adjacent site users (residents, pedestrians, workers, etc.)
	• Surface water run-off (during site development or post-development)	• Surface water (Rushcutters Bay)

It is noted that the above CSM is based on limited data, and further investigation to address data gaps and other possible sources (hazardous building materials and possible previous chemical use) may reveal additional contamination (which would likely lead to modification of the CSM).

12. Conclusions and Recommendations

Soil and groundwater sampling have been undertaken for this DSI. Based on the results for PAH in soil samples compared to health-based criteria, it is considered that remediation of contaminated fill will be required for the proposed development. Secondary contaminants that may need to be considered as part of the remediation include TRH, metals and OCP. Although asbestos-containing materials were not observed whilst sampling, the presence of asbestos in fill cannot be ruled out by the observations made in this investigation.

Prior to remediation, it is recommended that data gaps (for soil, groundwater and/or soil vapour) be addressed through further investigation when access is possible within building footprints and at 148 New South Head Road, Edgecliff. Results of such further investigations may influence the remediation approach.

Given that bulk excavation is proposed, the likely remediation approach for contaminated fill will be off-site disposal to an EPA licenced waste-receiving facility.

The variable concentrations of PAH and (to a lesser extent) lead will impact final waste classification of fill. It is recommended that additional testing be undertaken during the further investigation and at the time of excavation in order to appropriately segregate fill materials into different waste streams for off-site disposal.

Results for groundwater analysis indicate that treatment of groundwater (at least for metals and OCP) from dewatering will be required for off-site disposal to stormwater (if undertaken).

Based on the results of the DSI, it is considered that the site can be made suitable for the proposed mixed use (commercial and residential) development subject to implementation of the recommendations above.

13. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at 136-148 New South Head Road, Edgecliff in accordance with DP's proposal dated 18 December 2020 and acceptance received from Dennis Meyer dated 22 December 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Edgecliff Central 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 DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP 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 DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP 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.

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. DP 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 DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Asbestos has not been detected by observation or by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials, such as asphaltic concrete, were, however, located in previous below-ground filling, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

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, or to vegetation preventing visual inspection and reasonable access. 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.

Douglas Partners Pty Ltd

Appendix A

Drawing

LOCALITY MAP

Notes:
1. Basemap from metromap.com.au (dated 04/12/2020)
2. Boundary is approximate only
3. Test Locations are approximate only

Legend

- Site Boundary
- Combined Geotechnical and Environmental Borehole (Underpinner Rig)
- Environmental Borehole (Hand Auger)
- EI Australia Groundwater Monitoring Well

0 5 10 15 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	Edgecliff Central Pty Ltd		
OFFICE:	Sydney	DRAWN BY:	JH
SCALE:	1:250 @ A3	DATE:	01.03.2021

TITLE: **Site Location and Borehole Locations**
Proposed Mixed Use Development
136 - 148 New South Head Road, Edgecliff

N

PROJECT No:	200333.00
DRAWING No:	1
REVISION:	0

Appendix B

Notes About this Report

About this Report

Douglas Partners

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.

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.

Appendix C

Borehole Logs

BOREHOLE LOG

CLIENT: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136 - 148 New South Head Road, Edgecliff

SURFACE LEVEL: 35.2 AHD
EASTING: 336829
NORTHING: 6249929
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 200333.01
DATE: 1-2-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
35	0.04	CONCRETE PAVER: 40mm thick							A/E			PID = <1 ppm
	0.15	FILL/SAND:medium, pale brown to brown, dry to moist, bedding sand										
	0.6	FILL/SAND: medium, brown to grey-brown, with ripped sandstone gravel, trace of igneous gravel, dry to moist, apparently moderately compacted							A/E			PID = <1 ppm
34	1								A/E			PID = <1 ppm
		SAND SP: medium, pale brown to brown, dry to moist, medium dense to dense, colluvial										
33	2	Below 1.8m: becoming pale brown to yellow, moist							A/E			PID = <1 ppm
	2.4	SANDSTONE: medium grained, pale grey to pale brown, low strength, slightly weathered then moderately weathered, fractured, Hawkesbury Sandstone						2.6m: CORE LOSS: 480mm	C	100	100	PL(A) = 0.1
	3								C	18	0	
32	3.08											PL(A) = 0.2
								3.34m: B, 0-10°, pl, ro, cly co				
								3.81m: J, 20-30°, pl, ro, cln	C	100	70	PL(A) = 0.3
	4							4.11m: B, 0-10°, pl, ro, cly co				
31								4.22m: B, 0-10°, pl, ro, cly co				
								4.63m: J, 20-30°, pl, ro, cly co				
		4.85 to 4.93m: 80mm thick clay seam						4.75m: B, 0-10°, pl, ro, cly 20mm	C	100	73	PL(A) = 0.2
	5							4.85m: Cs, 80mm				
30								5.22m: B, 0-10°, pl, ro, cly co				
	5.5	SANDSTONE: medium grained, pale grey, 0-5% dark grey siltstone laminations, medium strength, fresh, slightly fractured to unbroken, Hawkesbury Sandstone										PL(A) = 0.8
	6								C	100	100	
29								6.55m: B, 0-10°, pl, ro, cln				
	7							7.05m: B, 0-10°, pl, ro, cly co				PL(A) = 0.6
28									C	100	99	
	8											PL(A) = 0.6
27								8.2m: B, 0-10°, pl, ro, cly 20mm				
	9	Below 8.9m: becoming medium to high strength							C	100	100	PL(A) = 1
26	10.0								C	100	100	

RIG: Underpinner **DRILLER:** SS **LOGGED:** AT **CASING:** 100mm PVC to 2.4m
TYPE OF BORING: Auger (TC-Bit) to 2.4m, NMLC Coring to 18.00m
WATER OBSERVATIONS: No free groundwater observed whilst augering
REMARKS: Location coordinates are in MGA94 Zone 56.

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: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136 - 148 New South Head Road, Edgecliff

SURFACE LEVEL: 35.2 AHD
EASTING: 336829
NORTHING: 6249929
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 200333.01
DATE: 1-2-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
25		SANDSTONE: medium grained, pale grey, 0-5% dark grey siltstone laminations, medium to high strength, fresh, unbroken, Hawkesbury Sandstone										PL(A) = 1.4
24	11							10.86m: B, 0-10°, pl, ro, cly co	C	100	100	PL(A) = 0.9
23	12							11.42m: B, 0-10°, pl, ro, cly co	C	100	100	PL(A) = 1.2
22	13								C	100	100	PL(A) = 1
	13.4	SANDSTONE: medium grained, pale grey, generally massive with siltstone flecks, high strength, fresh, unbroken, Hawkesbury Sandstone						13.39m: B, 0-10°, pl, ro, cly 10mm				
21	14											PL(A) = 1
								14.4m: J, 80°, pl, ro, cln				
20	15								C	100	100	
								15.15m: J, 80°, pl, ro, cln 15.35m: B, 0-10°, pl, ro, cly co				PL(A) = 1.5
19	16											PL(A) = 1.4
18	17								C	100	100	PL(A) = 1.9
17	18								C	100	100	PL(A) = 1.7
								18.34m: B, 0-10°, pl, ro, cly co				
	18.82	Bore discontinued at 18.82m										
16	19											

RIG: Underpinner **DRILLER:** SS **LOGGED:** AT **CASING:** 100mm PVC to 2.4m

TYPE OF BORING: Auger (TC-Bit) to 2.4m, NMLC Coring to 18.00m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

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

BORE: BH1 PROJECT: 200333.01 FEBRUARY 2021

2.40 – 7.00m

BORE: BH1 PROJECT: 200333.01 FEBRUARY 2021

7.00 – 12.00m

BORE: BH1 PROJECT: 200333.01 FEBRUARY 2021

12.00 – 17.00m

BORE: BH1 PROJECT: 200333.01 FEBRUARY 2021

17.00 – 19.00m

BOREHOLE LOG

CLIENT: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136 - 148 New South Head Road, Edgecliff

SURFACE LEVEL: 31.8 AHD
EASTING: 336810
NORTHING: 6249914
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 200333.01
DATE: 3-2-2021
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
31.8	0.05	CONCRETE SLAB: 50mm thick							A/E			PID = <1 ppm
	0.6	FILL/SAND: medium, grey to brown, with ripped sandstone gravel and cobbles, dry to moist, apparently variably compacted							A/E			PID = <1 ppm
31	0.8	SANDSTONE: medium grained, pale grey and pale brown, apparently low strength,Hawkesbury Sandstone						0.9m: J, 45°, pl, ro, healed 0.96m: B, 0-10°, pl, ro, cly co 1.4m: B, 0-10°, pl, ro, cln	C	100	94	PL(A) = 0.5
30	1	SANDSTONE: medium grained, pale grey and pale brown, medium strength, slightly weathered, slightly fractured, Hawkesbury Sandstone							C	100	100	PL(A) = 0.6
29	2											
28	3								C	100	100	PL(A) = 0.7
	3.2	SANDSTONE: medium grained, pale grey, 10-20% siltstone laminations, medium to high strength, fresh, slightly fractured to unbroken, Hawkesbury Sandstone						3.72m: B, 0-10°, pl, ro, cly co 3.82m: B, 0-10°, pl, ro, cly co				PL(A) = 0.9
27	4											
26	5								C	100	100	PL(A) = 1.1
	6							5.53m: B, 0-10°, pl, ro, cly co				
25	6.5	SANDSTONE: medium grained, pale grey, 10-20% siltstone laminations, high strength with some medium strength bands, fresh, slightly fractured to unbroken, Hawkesbury Sandstone						6.17m: B, 0-10°, pl, ro, cly co 6.35m: B, 0-10°, pl, ro, cly co 6.67m: B, 0-10°, pl, ro, cly co	C	100	100	PL(A) = 0.6
24	7											PL(A) = 1.2
23	8								C	100	100	PL(A) = 1
	9							8.67m: B, 0-10°, pl, ro, cly co				
22	10.0								C	100	100	PL(A) = 1.5

RIG: Underpinner **DRILLER:** SS **LOGGED:** AT **CASING:** 100mm PVC to 0.6m

TYPE OF BORING: Auger (TC-Bit) to 0.6m, Rotary to 0.8m, NMLC Coring to 18.00m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

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: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136 - 148 New South Head Road, Edgecliff

SURFACE LEVEL: 31.8 AHD
EASTING: 336810
NORTHING: 6249914
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 200333.01
DATE: 3-2-2021
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
21	11	SANDSTONE: medium grained, pale grey, generally massive with siltstone flecks and clasts, high strength, fresh, unbroken, Hawkesbury Sandstone						9.94m: B, 0-10°, pl, ro, cly co	C	100	100	PL(A) = 1
20	12								C	100	100	PL(A) = 1
								12.18m: B, 0-10°, pl, ro, fe stn				
19	13								C	100	100	PL(A) = 1.9
18	14											PL(A) = 1.2
									C	100	100	PL(A) = 1.4
17	15 15.0											
		Bore discontinued at 15.0m										
16	16											
15	17											
14	18											
13	19											
12												

RIG: Underpinner **DRILLER:** SS **LOGGED:** AT **CASING:** 100mm PVC to 0.6m

TYPE OF BORING: Auger (TC-Bit) to 0.6m, Rotary to 0.8m, NMLC Coring to 18.00m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56.

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

BORE: BH2 PROJECT: 200333.01 FEBRUARY 2021

0.80 – 5.00m

BORE: BH2 PROJECT: 200333.01 FEBRUARY 2021

5.00 – 10.00m

BORE: BH2 PROJECT: 200333.01 FEBRUARY 2021

10.00 – 15.00m

BOREHOLE LOG

CLIENT: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136-148 New South Head Road, Edgecliff

SURFACE LEVEL: ~34^
EASTING: 336823
NORTHING: 6249915
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 200333.00
DATE: 3/2/2021
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
		TERRACOTTA PAVEMENT							
	0.18	FILL/SAND: medium, brown, trace fine igneous gravel, moist		E*	0.2		PID = <1 ppm		
					0.3				
		Below 0.5 m: grading to brown mottled grey		E	0.5		PID = <1 ppm		
					0.6				
	1			E	1.0		PID = <1 ppm		1
					1.1				
	1.3	SAND: medium, yellow, moist, aeolian		E	1.5		PID = <1 ppm		
					1.6				
	1.8	Bore discontinued at 1.8m Target depth achieved							

RIG: Hand Tools **DRILLER:** JH **LOGGED:** JH **CASING:** Uncased

TYPE OF BORING: Concrete core to 0.18 m, hand auger to 1.8 m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Blind replicate BD1/20210203 at 0.2 to 0.3 m, ^Surface levels interpolated from survey drawing, Coordinates estimated from georeferenced site plan

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: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136-148 New South Head Road, Edgecliff

SURFACE LEVEL: ~34.5^
EASTING: 336820
NORTHING: 6249935
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 200333.00
DATE: 3/2/2021
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
		BRICK PAVEMENT							
	0.07	FILL/SAND: medium to coarse, brown mottled orange, trace white fine sandstone and fine igneous gravel, moist		E	0.1		PID = <1 ppm		
					0.2				
	0.6	SAND: medium, yellow mottled red, trace sandstone gravel, moist, aeolian		E	0.6		PID = <1 ppm		
	0.7	Bore discontinued at 0.7m Refusal on inferred sandstone			0.7				
	1								1

RIG: Hand Tools **DRILLER:** JH **LOGGED:** JH **CASING:** Uncased

TYPE OF BORING: Concrete core to 0.07 m, hand auger to 0.7 m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ^Surface levels interpolated from survey drawings, Coordinates estimated from georeferenced site plan

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: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136-148 New South Head Road, Edgecliff

SURFACE LEVEL: 32.7^
EASTING: 336810
NORTHING: 6249930
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 200333.00
DATE: 3/2/2021
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
	0.01	ASPHALTIC CONCRETE							
		FILL/SAND: medium, yellow, trace sandstone and asphaltic concrete, moist		E	0.05		PID = <1 ppm		
	0.15	FILL/SAND: medium, pale grey, trace clay and sandstone gravel, moist			0.15				
				E	0.3		PID = <1 ppm		
					0.4				
	0.45	Bore discontinued at 0.45m Refusal on inferred sandstone							
	1								1

RIG: Hand Tools **DRILLER:** JH **LOGGED:** JH **CASING:** Uncased

TYPE OF BORING: Concrete core to 0.01 m, hand auger to 0.45 m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ^Surface levels interpolated from survey drawings, Coordinates estimated from georeferenced site plan

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)

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BOREHOLE LOG

CLIENT: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136-148 New South Head Road, Edgecliff

SURFACE LEVEL: 32.7^
EASTING: 336803
NORTHING: 6249933
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 200333.00
DATE: 3/2/2021
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
	0.01	ASPHALTIC CONCRETE							
		FILL/SAND: medium, yellow, trace fine to medium igneous gravel, moist		E*	0.1		PID = <1 ppm		
	0.2	FILL/SAND: medium, pale grey, trace clay and sandstone gravel, moist			0.2				
		Below 0.3 m: grading to red mottled pale grey, with sandstone gravel		E	0.3		PID = <1 ppm		
	0.4	Bore discontinued at 0.4m Refusal on inferred sandstone			0.4				
	1								1

RIG: Hand Tools **DRILLER:** JH **LOGGED:** JH **CASING:** Uncased

TYPE OF BORING: Concrete core to 0.01 m, hand auger to 0.4 m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Blind replicate BD2/20210203 at 0.1 to 0.2 m, ^Surface levels interpolated from survey drawings, Coordinates estimated from georeferenced site plan

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: Edgecliff Central Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 136-148 New South Head Road, Edgecliff

SURFACE LEVEL: 32.8^
EASTING: 336794
NORTHING: 6249938
DIP/AZIMUTH: 90°/--

BORE No: BH7
PROJECT No: 200333.00
DATE: 3/2/2021
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
	0.04	ASPHALTIC CONCRETE							
		FILL/Gravelly SAND: medium, brown mottled black, medium igneous gravel, trace asphaltic concrete, moist		E	0.05		PID = 1 ppm		
	0.15	FILL/SAND: medium, yellow mottled pale grey, trace clay, moist			0.15				
		Below 0.3 m: grading to pale grey, with sandstone gravel			0.4				
				E			PID = <1 ppm		
					0.5				
	0.6	Bore discontinued at 0.6m Refusal on inferred sandstone							
	1								1

RIG: Hand Tools **DRILLER:** JH **LOGGED:** JH **CASING:** Uncased

TYPE OF BORING: Concrete core to 0.04 m, hand auger to 0.6 m.

WATER OBSERVATIONS: No free groundwater observed

REMARKS: ^Surface levels interpolated from survey drawings, Coordinates estimated from georeferenced site plan

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)

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Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

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

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

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

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

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

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

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

Rock Quality Designation

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

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

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

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

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

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

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

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

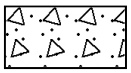
Symbols & Abbreviations

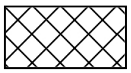
Graphic Symbols for Soil and Rock

General

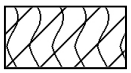

Asphalt

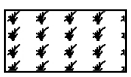

Road base

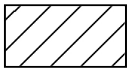

Concrete

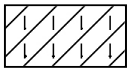

Filling

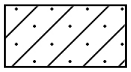
Soils


Topsoil

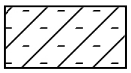

Peat

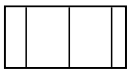

Clay

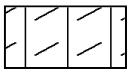

Silty clay

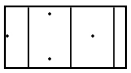

Sandy clay

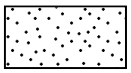

Gravelly clay

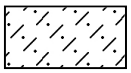

Shaly clay

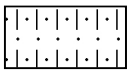

Silt


Clayey silt


Sandy silt

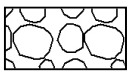

Sand

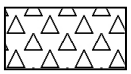

Clayey sand


Silty sand


Gravel

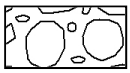

Sandy gravel


Cobbles, boulders

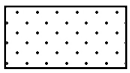

Talus

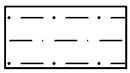
Sedimentary Rocks

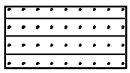

Boulder conglomerate

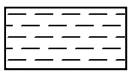

Conglomerate


Conglomeratic sandstone

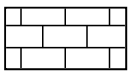

Sandstone


Siltstone

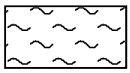

Laminite

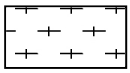

Mudstone, claystone, shale

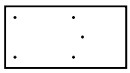

Coal


Limestone

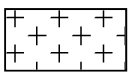
Metamorphic Rocks

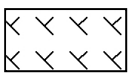

Slate, phyllite, schist

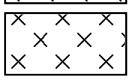

Gneiss

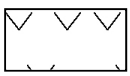

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix D

Groundwater Field Sheets

Douglas Partners
Geotechnics / Environment / Groundwater

Groundwater (GW) Field Sheet

Project and Bore Installation Details						
Project Name / Site Location	PROPOSED MIXED USE DEVELOPMENT, EDGECLIFF				Project Number	200333
Well Construction Details	Well ID	BHIM	Drilling Method		Hole Diameter (m)~	0.125
	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	3/2/21 7:30 AM SUNNY			Purged By	JH
Purge Method / Equipment	TWISTER PUMP				
Product observed / Thickness	—	mm	Confirmed with Bailer? (Y / N)	—	
GW Level (pre-purge)	2.923	m bgl	Observed Well Depth	8.84	m bgl
Height of Water Column (H)	~~8.84~~ 5.92	m bgl	Estimated Bore Volume*	30	L
GW Level (post-purge)	—	m bgl	Total Volume Purged**	20	L
Appearance/Comments	PURGED DRY, HIGHLY TURBID, NO ODOUR/SHEEN				

Sampling Details					
Date / Time / Weather Conditions	5/2/21 9:15 AM SUNNY			Sampled By	JH
Sampling Method / Equipment	PERI PUMP				
WQM Model	YSI		WQM Calibration Date	04/02/21	
Product observed / Thickness	—	mm	Confirmed with Bailer? (Y / N)	—	
GW Level (pre-micropurge)	4.145	m bgl	Observed Well Depth	8.84	m bgl
Height of Water Column	4.695	m bgl	Estimated Bore Volume*	24	L
GW Level (post sample)	5.985	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%
9:30	0.5	20.7	6.94	235.4	5.14	218.3	800
9:31	1.0	20.5	6.83	227.5	5.23	216.2	372
9:32	1.5	20.5	6.97	213.5	5.25	215.8	343
9:33	2.0	20.5	7.12	209.8	5.28	215.6	344
9:34	2.5	20.5	7.18	209.1	5.29	216.3	346
9:35	3.0	20.5	7.31	207.5	5.30	218.4	368
9:36	3.5	20.5	7.35	207.2	5.30	217.4	385
9:37	4.0	20.5	7.40	206.7	5.30	217.8	402
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)	7	m bgl,				
Sample Observations (e.g. colour, sediment, sheen, odour)	M TURBID, GREY, NO ODOUR/SHEEN					
Sample ID	~~BHGM~~ BHIM					
QAQC Samples	Replicate	X	Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	3 x 500ML	Plastic	1 x 500ML	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	1	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	3
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		Other	
Comments	BD1/20210205					

*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	PROPOSED MIXED USE DEVELOPMENT, EDGECLIFF				Project Number	200333
Well Construction Details	Well ID	BH6M	Drilling Method		Hole Diameter (m)~	0.125
	Well Depth (m bgl)	8.90	Screened (m bgl)		Stick Up (m)	—
Survey Information	Easting		Northing		Elevation RL	
GW Level During Drilling		m bgl				
Contaminants/Comments	PREVIOUS WELL					

Well Development Details					
Date / Time / Weather Conditions	2/2/21 1:45PM SUNNY/OVERCAST			Purged By	JH
Purge Method / Equipment	TWISTER PUMP				
Product observed / Thickness	—	mm	Confirmed with Bailer? (Y / N)	—	
GW Level (pre-purge)	3.990	m bgl	Observed Well Depth	8.90	m bgl
Height of Water Column (H)	4.91	m bgl	Estimated Bore Volume*	26.514	L
GW Level (post-purge)		m bgl	Total Volume Purged**	20 15L	L
Appearance/Comments	HIGHLY TURBID, BROWN, NO ODOUR/SHEEN, PURGED DRY.				

Sampling Details					
Date / Time / Weather Conditions	5/2/21 10:10 AM SUNNY			Sampled By	JH
Sampling Method / Equipment	PERI PUMP				
WQM Model	XSI		WQM Calibration Date	4/2/21	
Product observed / Thickness	—	mm	Confirmed with Bailer? (Y / N)	—	
GW Level (pre-micropurge)	3.752	m bgl	Observed Well Depth	8.90	m bgl
Height of Water Column	5.15	m bgl	Estimated Bore Volume*	26	L
GW Level (post sample)		m bgl	Total Volume of Micro-Purged		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%
10:16	0.5	21.6	1.69	298.1	4.32	204.9	75
10:17	1.0	21.0	0.50	290.9	4.27	222.4	120
10:18	1.5	21.1	0.34	289.9	4.27	225.4	85
10:19	2.0	21.1	0.30	289.5	4.26	228.8	175
10:20	2.5	21.2	0.34	290.4	4.25	232.4	184
10:21	3.0	21.2	0.29	289.2	4.25	236.2	181
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)	7.0	m bgl,				
Sample Observations (e.g. colour, sediment, sheen, odour)	S TURBID, GREY, NO ODOUR/SHEEN					
Sample ID	BH6M					
QAQC Samples	Replicate		Triplicate		Other	
Sample Containers Quantity / Preservation / Filtration	Amber glass	3 x 500	Plastic	1 x 500	PFAS (no teflon)	
	Metals (F/UF) (HNO3)	1	Phenols/COD/NH3 (H2SO4)		Vials (HCl)	3
	Ferrous/Ferric Iron (HCl)		Cyanides/Chromium (NaOH)		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

Summary Tables for Analytical Results

Douglas Partners
Geotechnics / Environment / Groundwater

Table E1: Summary of Laboratory Results for Soil Contaminants

			Metals								TRH						BTEX				PAH				Phenol	OCP															OPP	PCB	Asbestos
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	C6-C10 less BTEX	>C10-C16 less Naphthalene	>C16-C34	>C34-C40	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs	Total Phenols	DDD	DDT+DDE+DDD	DDE	DDT	Aldrin	Dieldrin	Aldrin & Dieldrin	Total Chlordane	Endrin	Total Endosulfan	Heptachlor	Hexachlorobenzene	Methoxychlor	Chlorpyriphos	Total PCB	Asbestos (50 g)
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	0.1	0.05	0.5	0.05	5	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	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	-
BH1	0.5 - 0.6 m	01/02/2021	<4	<0.4	3	31	330	4	2	100	<25	<50	<25	<50	2400	490	<0.2	<0.5	<1	<1	2.1	67	93	620	<5	<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	No AD
BH1 - [TRIPLICATE]	0.5 - 0.6 m	01/02/2021	<4	<0.4	3	25	640	2.9	2	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.1 - 0.2 m	03/02/2021	<4	0.4	5	71	260	1.2	5	260	<25	52	<25	52	2300	470	<0.2	<0.5	<1	<1	1.5	33	46	340	<5	<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	No AD
BH3	0.2 - 0.3 m	03/02/2021	<4	<0.4	2	13	94	<0.1	1	32	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	0.4	<0.5	3.4	<5	<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	No AD
BD1/20210203	0.2 - 0.3 m	03/02/2021	<4	<0.4	2	14	120	<0.1	1	32	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	-
BH3	1.5 - 1.6 m	03/02/2021	<4	<0.4	2	<1	4	<0.1	1	2	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	0.1 - 0.2 m	03/02/2021	<4	<0.4	4	21	93	0.2	3	81	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	0.55	0.7	4.5	<5	<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	No AD
BH5	0.05 - 0.15 m	03/02/2021	<4	<0.4	4	21	140	<0.1	2	140	<25	58	<25	58	1500	460	<0.2	<0.5	<1	<1	0.7	21	30	200	<5	<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	No AD
BH5	0.3 - 0.4 m	03/02/2021	<4	<0.4	5	16	73	<0.1	2	240	<25	<50	<25	<50	830	260	<0.2	<0.5	<1	<1	0.5	17	24	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6	0.3 - 0.4 m	03/02/2021	<4	<0.4	5	8	12	<0.1	6	8	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	0.1	<0.5	0.8	<5	<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	No AD
BH7	0.05 - 0.15 m	03/02/2021	<4	<0.4	3	120	67	0.4	14	72	<25	280	<25	280	7400	1000	<0.2	<0.5	<1	<1	3.8	130	220	1700	<5	<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	No AD
BH7 - [TRIPLICATE]	0.05 - 0.15 m	03/02/2021	<4	<0.4	3	130	94	0.3	16	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0.4 - 0.5 m	03/02/2021	<4	<0.4	3	3	10	<0.1	<1	2	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	1.4	2	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site Assessment Criteria																																									
HIL B			500	150	500 for Cr(VI)	30000	1200	120	1200	60000	-	-	-	-	-	-	-	-	-	-	-	-	4	400	130*	-	600	-	-	-	-	10	90	20	400	10	15	500	340	1	-
HSL D for vapour intrusion			-	-	-	-	-	-	-	-	-	-	260	NL	-	-	3	NL	NL	230	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL for direct contact			-	-	-	-	-	-	-	-	5600	4200	-	-	5800	8100	140	2100	5900	17000	2200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL			100	-	200 for Cr (III)	85	1260	-	15	280	-	-	-	-	-	-	-	-	-	-	170	-	-	-	-	-	-	-	180	-	-	-	-	-	-	-	-	-	-	-
ESL			-	-	-	-	-	-	-	-	-	120	180	-	300	2800	50	85	70	105	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limit			-	-	-	-	-	-	-	-	700	1000	-	-	2500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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

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

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological scree

Notes:

BH1 - [TRIPLICATE]	laboratory triplicate of sample above
BD1/20210203	field replicate sample of sample above
BH7 - [TRIPLICATE]	laboratory triplicate of sample above
*	value for pentachlorophenol

Site Assessment Criteria (SAC):

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

HIL B	Residential / Low - High Density (NEPC, 2013)
HSL D	Commercial / Industrial (vapour intrusion)(sand, 0m to <1m) (NEPC, 2013)
DC HSL B	Direct contact HSL B Residential (high density) (direct contact) (CRC CARE, 2011)
EIL/ESL UR/POS	Urban Residential and Public Open Space (fine soil) (NEPC, 2013)
ML R/P/POS	Residential, Parkland and Public Open Space (fine soil) (NEPC, 2013)

Table E2: Summary of Results of Groundwater Analysis (All results in µg/L)

Sample Location or Sample Identification	Sample Date	Metals (dissolved)								Polycylic Aromatic Hydrocarbons (PAH)						Total Recoverable Hydrocarbons (TRH)						BTEX					Polychlorinated Biphenyls (PCB)			Organochlorine Pesticides (OCP)														Organophosphorus Pesticides (OPP)											
		Arsenic	Cadmium	Chromium (III + VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Anthracene	Fluoranthene	Benzo(a)pyrene	Phenanthrene	All other PAH	TRH C6-C10 less BTEX	TRH >C10-C16 less Naphthalene	TRH C6-C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toulene	Ethylbenzene	o-xylene	m+p-xylene	Aroclor 1242	Aroclor 1254	Other PCB	Aldrin	Dieldrin	gamma-Chlordane	alpha-Chlordane	pp-DDT	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Methoxychlor	Other OCP	Azinphos-methyl	Bromophos-ethyl	Chlorpyrifos	Diazinon	Dichlorovos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Methyl Parathion	Other OPP
Analytical Results																																																						
BH1M	05/02/2021	<1	<0.1	<1	**19**	<1	<0.05	3	**37**	<0.02	<0.01	<0.01	<0.01	<0.01	<PQL	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.01	<0.01	<PQL	<0.001	**0.073**	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	0.009	<0.001	<PQL	<0.02	<0.2	<0.009	<0.01	<0.2	<0.15	<0.2	<0.2	<0.05	<0.004	<0.2	<PQL
BD1/20210205	05/02/2021	<1	<0.1	<1	**2**	<1	<0.05	2	11	-	-	-	-	-	-	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6M	05/02/2021	<1	0.4	<1	**80**	**17**	<0.05	**13**	**190**	<0.02	<0.01	<0.01	<0.01	<0.01	<PQL	<10	<50	<10	<50	<100	<100	<1	<1	<1	<1	<2	<0.01	<0.01	<PQL	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<PQL	<0.02	<0.2	<0.009	<0.01	<0.2	<0.15	<0.2	<0.2	<0.05	<0.004	<0.2	<PQL
Site Assessment Criteria																																																					
Marine Water DGV		-	0.7	27.4 for Cr(III) 4.4 for Cr(VI)	1.3	4.4	0.1	7	15	50	0.01	1	0.1	0.6	-	-	-	-	-	-	-	500	180	80	350	75 for m-xylene 200 for p-xylene	0.3	0.01	-	0.003	0.01	0.001		0.0004	0.005		0.004	0.0004	-	0.004	-	0.01	-	0.009	0.01	-	0.15	-	0.001	0.05	0.004	-	-
Recreational Water Guidelines - Health		100	20	500 for Cr(VI)	20000	100	10	200	-	-	-	-	0.1	-	-	-	-	-	-	-	-	10	8000	3000	6000		-	-	-	3		20		90	200		-	3		3000	-	300	100	100	40	50	70	40	70	700	200	7	-
Recreational Water Guidelines - Aesthetic		-	-	-	1000	-	-	-	3000	-	-	-	-	-	-	-	-	-	-	-	-	-	25	3	20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

PQL	Practical Quantitation Limit
BOLD	Exceeds DGV
BD1/20210205	is a blind replicate sample from BH1M
-	not defined/ not analysed/ not applicable

Table E2 (continued): Summary of Results of Groundwater Analysis (All results in µg/

Sample Location or Sample Identification	Sample Date	Phenols											Volatile Organic Compounds (VOC)																																			
		2346-Tetrachlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,6-Dichlorophenol	2-Chlorophenol	Pentachlorophenol	Phenol	2,4-Dinitrophenol	4-Nitrophenol	Other Phenols	Isopropylbenzene	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	cis-1,3-Dichloropropene	Vinyl chloride	Tetrachloroethene	Trichloroethene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	Chlorobenzene	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,2-Dichloroethane	Carbon tetrachloride	Chloroform	Bromodichloromethane	Dibromochloromethane	Bromoform	1,2-Dichloropropane	1,3-Dichloropropane	1,1,2,2-Tetrachloroethane	Styrene	Hexachlorobutadiene	Other VOC
Anaytical Results																																														
BH1M	05/02/2021	<1	<1	<1	<1	<1	<1	<5	<1	<20	<20	<PQL	<1	<1	<1	<1	<1	<1	<1	<10	<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	<PQL
BD1/20210205	05/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH6M	05/02/2021	<1	<1	<1	<1	<1	<1	<5	<1	<20	<20	<PQL	<1	<1	<1	<1	<1	<1	<1	<10	<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	<PQL
Site Assessment Criteria																																														
Marine Water Default Guideline Values (DGV)		10	3	120	2	34	340	11	400	45	58	-	30	700	-	-	-		100	70	330	-	20	160	260	60	55	270	1900	1900	240	370	-	-	-	900	1100	400	-	-	-
Recreational Water Guidelines - Health		-	200	-	2000	-	3000	100	-	-	-	-	-	300	600		1000		3	500	-	300		15000	-	400	3000	-	-	30	30	2500			-	-	-	300	7	-
Recreational Water Guidelines - Aesthetic		-	2	-	0.3	-	0.1	-	-	-	-	-	-	-	-		-		-	-	-	5		1	20	0.3	10	-	-	-	-	-			-	-	-	4	-	-

Notes:

PQL	Practical Quantitation Limit
BOLD	Exceeds DGV
BD1/20210205	is a blind replicate sample from BH1M
-	not defined/ not analysed/ not applicable

Douglas Partners
Geotechnics / Environment / Groundwater

Table E3: Summary of Laboratory Results for Waste Classification

			Metals							TRH		BTEX						PAH			Phenol	OCP		OPP	PCB	Asbestos
			Arsenic	Cadmium	Total Chromium	Lead	TCLP Lead	Mercury (inorganic)	Nickel	TRH C6 - C9	C10-C36 recoverable hydrocarbons	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene	Xylenes (total)	Benzo(a)pyrene	TCLP Benzo(a)pyrene	Total PAHs	Total Phenol	Total Endosulfan	Total Analysed OCP	Total Analysed OPP	Total PCB	Total Asbestos
		PQL	4	0.4	1	1	0.03	0.1	1	25	50	0.2	0.5	1	2	1	3	0.05	0.001	0.05	5	0.1	0.1	0.1	0.1	
Sample ID	Depth	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	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/kg	mg/kg	mg/kg	mg/kg	mg/kg	-
BH1	0.5 - 0.6 m	01/02/2021	<4	<0.4	3	330	3.2	4	2	<25	2690	<0.2	<0.5	<1	<2	<1	<3	67	<0.001	620	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH1 - [TRIPLICATE]	0.5 - 0.6 m	01/02/2021	<4	<0.4	3	640	-	2.9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	0.1 - 0.2 m	03/02/2021	<4	0.4	5	260	0.3	1.2	5	<25	2500	<0.2	<0.5	<1	<2	<1	<3	33	<0.001	340	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH3	0.2 - 0.3 m	03/02/2021	<4	<0.4	2	94	NT	<0.1	1	<25	<50	<0.2	<0.5	<1	<2	<1	<3	0.4	NT	3.4	<5	<0.1	<0.1	<0.1	<0.1	No AD
BD1/20210203	0.2 - 0.3 m	03/02/2021	<4	<0.4	2	120	0.84	<0.1	1	<25	<50	<0.2	<0.5	<1	<2	<1	<3	NT	NT	NT	NT	NT	NT	NT	NT	-
BH3	1.5 - 1.6 m	03/02/2021	<4	<0.4	2	4	-	<0.1	1	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	-	<0.05	-	-	-	-	-	-
BH4	0.1 - 0.2 m	03/02/2021	<4	<0.4	4	93	-	0.2	3	<25	<50	<0.2	<0.5	<1	<2	<1	<3	0.55	-	4.5	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH5	0.05 - 0.15 m	03/02/2021	<4	<0.4	4	140	0.43	<0.1	2	<25	1690	<0.2	<0.5	<1	<2	<1	<3	21	<0.001	200	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH5	0.3 - 0.4 m	03/02/2021	<4	<0.4	5	73	-	<0.1	2	<25	940	<0.2	<0.5	<1	<2	<1	<3	17	<0.001	140	-	-	-	-	-	-
BH6	0.3 - 0.4 m	03/02/2021	<4	<0.4	5	12	-	<0.1	6	<25	<50	<0.2	<0.5	<1	<2	<1	<3	0.1	-	0.8	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH7	0.05 - 0.15 m	03/02/2021	<4	<0.4	3	67	-	0.4	14	<25	8987	<0.2	<0.5	<1	<2	<1	<3	130	<0.001	1700	<5	<0.1	<0.1	<0.1	<0.1	No AD
BH7 - [TRIPLICATE]	0.05 - 0.15 m	03/02/2021	<4	<0.4	3	94	-	0.3	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH7	0.4 - 0.5 m	03/02/2021	<4	<0.4	3	10	-	<0.1	<1	<25	<50	<0.2	<0.5	<1	<2	<1	<3	1.4	<0.001	14	-	-	-	-	-	-
Waste Classification Criteria																										
CT1			100	20	100	100	N/A	4	40	650	10000	10	288	600	NC	NC	1000	0.8	N/A	200	288	60	<50	4	<50	NC
SCC1			500	100	1900	1500	N/A	50	1050	650	10000	18	518	1080	NC	NC	1800	10	N/A	200	518	108	<50	7.5	<50	NC
TCLP1			N/A	N/A	N/A	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NC	NC	N/A	N/A	0.04	N/A	N/A	N/A	N/A	N/A	N/A	NC
CT2			400	80	400	400	N/A	16	160	2600	40000	40	1152	2400	NC	NC	4000	3.2	N/A	800	1152	240	<50	16	<50	NC
SCC2			2000	400	7600	6000	N/A	200	4200	2600	40000	72	2073	4320	NC	NC	7200	23	N/A	800	2073	432	<50	30	<50	NC
TCLP2			N/A	N/A	N/A	N/A	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NC	NC	N/A	N/A	0.16	N/A	N/A	N/A	N/A	N/A	N/A	NC

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

NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable

Notes:

BD1/20210203	Field replicate of sample listed directly above
	Total chromium used as initial screen for chromium(VI).
	Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
	Criteria for scheduled chemicals used as an initial screen
	Criteria for Chlorpyrifos used as initial screen
PQL	Practical quantitation limit
CT1	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
SCC1	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
TCLP1	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
CT2	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
SCC2	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
TCLP2	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste, Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

Appendix F

QA / QC Procedures and Results

QA / QC PROCEDURES AND RESULTS

Q1. Data Quality Objectives

The Detailed Site Investigation (DSI) was prepared with reference to the seven step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* 1999 as amended 2013 (NEPC, 2013). The DQO process is outlined as follows:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors; and
- Optimising the Design for Obtaining Data.

The DQOs have been addressed within the report as shown in Table Q1.

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section where Addressed
State the Problem	S1 Introduction
Identify the Decision	S9 Results S12 Conclusion and Recommendations
Identify Inputs to the Decision	S1 Introduction S4 Site Information S5 Environmental Setting S6 Previous Reports and Site History
Define the Boundary of the Assessment	S4.1 Site Identification Drawing 1 Appendix B
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S7 Sampling and Analysis Quality Plan S10.4 Data Quality Assurance and Quality Control
Optimise the Design for Obtaining Data	S3 Scope of Works S7 Sampling and Analysis Quality Plan

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory QC procedures and results are summarised in the following Table Q2.

Table Q2: Field and Laboratory QC

Item	Evaluation / Acceptance Criteria	Achievement
Analytical laboratory used	NATA accreditation.	Yes
Recommended holding times for soil analysis	Various based on type of analysis	PAH in TCLP and pH analysis undertaken very slightly outside recommended holdings times (14 days and 7 days, respectively) and considered not to be of concern, particularly given the 'old' age of contamination in the soil sampled.
Recommended holding times for groundwater analysis	Various based on type of analysis	Yes
Intra-laboratory soil replicate	<50% RPD (for >5 x PQL), and analysis of replicates at rate of 10% of primary samples	Yes. For sample pair BD1/20210203 and BH3, 0.2-0.3 m, RPD are as follows: • 0% for arsenic, cadmium, chromium, mercury, nickel, zinc, TRH, BTEX and naphthalene; • 7% for copper; and • 24% for lead. Replicates analysed at a rate of 10% of primary samples.
Intra-laboratory groundwater replicate	<50% RPD (for >10-20 x PQL), and analysis of replicates at rate of 10% of primary samples	Yes. For sample pair BD1/20210205 and BH1M, RPD are as follows: • 0% for arsenic, cadmium, chromium, lead, mercury, TRH, BTEX and naphthalene; • 162% for copper, but a concentration is less than 10 x PQL; • 40% for nickel; • 108% for zinc, but a concentration is less than 20 x PQL. Replicates analysed at a rate of 50% of primary samples.

Item	Evaluation / Acceptance Criteria	Achievement
Laboratory / Reagant Blanks	<PQL	Yes
Matrix Spikes	70-130% recovery (inorganics); 60-140% recovery (organics)	Yes, although matrix spike recoveries were not possible in some instances due to high concentrations of analytes causing interference.
Surrogate Spikes	All organics analysis; 70-130% recovery (inorganics); 60-140% recovery (organics)	Yes, although surrogate recoveries were not possible in some instances due to high concentrations of analytes causing interference.
Control Samples	70-130% recovery (inorganics); 60-140% recovery (organics); 10-140% for speciated phenols	Yes
Laboratory replicate analysis for soil	<50% RPD (for >5 x PQL)	Most RPD values were within the RPD acceptance criteria. Triplicate results have been issued where the RPD acceptance criteria have been exceeded. It is noted that high RPD values are not unexpected given the non -homogeneous nature of the fill.

Trip spikes and / or trip blanks were not used in this investigation. This is considered of little significance, as there was considered to be a low potential for the presence of volatiles being present in the samples collected (particularly given an absence of odours and PID results).

Rinsate samples were not collected from the dip-meter following decontamination. Analytical results for groundwater do not suggest that cross-contamination may have occurred between groundwater monitoring wells.

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

Q3. Data Quality Indicators

The reliability of field procedures and analytical results was assessed against the following data quality indicators (DQIs):

- 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.

The DQIs were assessed as outlined in the following Table Q3.

Table Q3: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Soil sampling undertaken where possible at site; 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; NATA accredited laboratory results certificates provided by the laboratory; Satisfactory results for field and laboratory quality control samples as discussed in Section Q2.
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Experienced sampler(s) used; Use of a NATA accredited laboratory; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Sample numbers recovered and analysed are considered to be representative of the sampled media and complying with DQOs; Samples were extracted and analysed within recommended holding times or very slightly outside of recommended 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 field and laboratory QC samples.

Based on the above, it is considered that the DQIs have been complied with. As such, it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

Appendix G

Laboratory Certificates, Chain of Custody and Sample Receipt Advice

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 261144

Client Details

Client	Douglas Partners Pty Ltd
Attention	Jack Hinchliffe
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**200333.00, Edgecliff**
Number of Samples	11 SOIL, 3 water
Date samples received	08/02/2021
Date completed instructions received	08/02/2021

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	15/02/2021
Date of Issue	16/02/2021
Reissue Details	This report replaces R00 created on 15/02/2021 due to: extra information requested (report comment).

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Greta Petzold, Senior Chemist
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Ken Nguyen, Reporting Supervisor
Lucy Zhu, Asbestos Supervisor
Manju Dewendrage, Chemist
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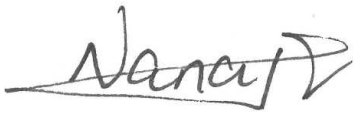
Authorised By



Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		261144-1	261144-2	261144-3	261144-4	261144-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	1.5-1.6	0.1-0.2
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH 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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	84	70	76	82	81

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		261144-6	261144-7	261144-8	261144-9	261144-10
Your Reference	UNITS	BH5	BH5	BH6	BH7	BH7
Depth		0.05-0.15	0.3-0.4	0.3-0.4	0.05-0.15	0.4-0.5
Date Sampled		03/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH 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	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	75	72	73	81	82

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		261144-11
Your Reference	UNITS	BD1/20210203
Depth		-
Date Sampled		03/02/2021
Type of sample		SOIL
Date extracted	-	09/02/2021
Date analysed	-	10/02/2021
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH 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	<3
Surrogate aaa-Trifluorotoluene	%	74

svTRH (C10-C40) in Soil						
Our Reference		261144-1	261144-2	261144-3	261144-4	261144-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	1.5-1.6	0.1-0.2
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	09/02/2021	09/02/2021	09/02/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	1,700	1,500	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	990	1,000	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	52	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	52	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	2,400	2,300	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	490	470	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	2,900	2,800	<50	<50	<50
Surrogate o-Terphenyl	%	#	#	82	86	73

svTRH (C10-C40) in Soil						
Our Reference		261144-6	261144-7	261144-8	261144-9	261144-10
Your Reference	UNITS	BH5	BH5	BH6	BH7	BH7
Depth		0.05-0.15	0.3-0.4	0.3-0.4	0.05-0.15	0.4-0.5
Date Sampled		03/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	09/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	87	<50
TRH C_{15} - C_{28}	mg/kg	920	480	<100	5,900	<100
TRH C_{29} - C_{36}	mg/kg	770	460	<100	3,000	<100
TRH >C_{10} -C_{16}	mg/kg	58	<50	<50	280	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	58	<50	<50	280	<50
TRH >C_{16} -C_{34}	mg/kg	1,500	830	<100	7,500	<100
TRH >C_{34} -C_{40}	mg/kg	460	260	<100	1,000	<100
Total +ve TRH (>C10-C40)	mg/kg	2,000	1,100	<50	8,800	<50
Surrogate o-Terphenyl	%	#	90	73	#	85

svTRH (C10-C40) in Soil		
Our Reference		261144-11
Your Reference	UNITS	BD1/20210203
Depth		-
Date Sampled		03/02/2021
Type of sample		SOIL
Date extracted	-	09/02/2021
Date analysed	-	09/02/2021
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	86

PAHs in Soil						
Our Reference		261144-1	261144-2	261144-3	261144-4	261144-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	1.5-1.6	0.1-0.2
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Naphthalene	mg/kg	2.1	1.5	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<1	3.5	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	1.6	0.5	<0.1	<0.1	<0.1
Fluorene	mg/kg	2.3	2.5	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	77	36	0.2	<0.1	0.2
Anthracene	mg/kg	20	11	0.1	<0.1	<0.1
Fluoranthene	mg/kg	130	61	0.5	<0.1	0.6
Pyrene	mg/kg	130	63	0.5	<0.1	0.8
Benzo(a)anthracene	mg/kg	11	43	0.4	<0.1	0.6
Chrysene	mg/kg	5.3	31	0.3	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	99	35	0.6	<0.2	0.8
Benzo(a)pyrene	mg/kg	67	33	0.4	<0.05	0.55
Indeno(1,2,3-c,d)pyrene	mg/kg	30	9.9	0.2	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	12	3.4	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	36	11	0.3	<0.1	0.3
Total +ve PAH's	mg/kg	620	340	3.4	<0.05	4.5
Benzo(a)pyrene TEQ calc (zero)	mg/kg	93	46	<0.5	<0.5	0.7
Benzo(a)pyrene TEQ calc(half)	mg/kg	93	46	0.5	<0.5	0.8
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	93	46	0.6	<0.5	0.8
Surrogate p-Terphenyl-d14	%	126	87	75	89	90

PAHs in Soil						
Our Reference		261144-6	261144-7	261144-8	261144-9	261144-10
Your Reference	UNITS	BH5	BH5	BH6	BH7	BH7
Depth		0.05-0.15	0.3-0.4	0.3-0.4	0.05-0.15	0.4-0.5
Date Sampled		03/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Naphthalene	mg/kg	0.7	0.5	<0.1	3.8	<0.1
Acenaphthylene	mg/kg	2.9	2.5	<0.1	2.5	0.3
Acenaphthene	mg/kg	0.5	<0.1	<0.1	<1	<0.1
Fluorene	mg/kg	0.6	0.5	<0.1	11	0.1
Phenanthrene	mg/kg	13	8.4	<0.1	160	1.1
Anthracene	mg/kg	3.6	3.0	<0.1	36	0.3
Fluoranthene	mg/kg	36	23	0.2	290	2.3
Pyrene	mg/kg	38	23	0.2	290	2.4
Benzo(a)anthracene	mg/kg	24	15	0.1	200	1.6
Chrysene	mg/kg	15	15	<0.1	140	1.3
Benzo(b,j+k)fluoranthene	mg/kg	25	19	0.2	230	2.1
Benzo(a)pyrene	mg/kg	21	17	0.1	130	1.4
Indeno(1,2,3-c,d)pyrene	mg/kg	9.6	7.0	<0.1	64	0.6
Dibenzo(a,h)anthracene	mg/kg	3.0	2.2	<0.1	35	0.2
Benzo(g,h,i)perylene	mg/kg	10	7.2	<0.1	75	0.7
Total +ve PAH's	mg/kg	200	140	0.80	1,700	14
Benzo(a)pyrene TEQ calc (zero)	mg/kg	30	24	<0.5	220	2.0
Benzo(a)pyrene TEQ calc(half)	mg/kg	30	24	<0.5	220	2.0
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	30	24	<0.5	220	2.0
Surrogate p-Terphenyl-d14	%	86	86	70	90	73

Organochlorine Pesticides in soil						
Our Reference		261144-1	261144-2	261144-3	261144-5	261144-6
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	0.1-0.2	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	112	101	89	96

Organochlorine Pesticides in soil			
Our Reference		261144-8	261144-9
Your Reference	UNITS	BH6	BH7
Depth		0.3-0.4	0.05-0.15
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	111

Organophosphorus Pesticides in Soil						
Our Reference		261144-1	261144-2	261144-3	261144-5	261144-6
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	0.1-0.2	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	112	101	89	96

Organophosphorus Pesticides in Soil			
Our Reference		261144-8	261144-9
Your Reference	UNITS	BH6	BH7
Depth		0.3-0.4	0.05-0.15
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	111

PCBs in Soil						
Our Reference		261144-1	261144-2	261144-3	261144-5	261144-6
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	0.1-0.2	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	112	101	89	96

PCBs in Soil			
Our Reference		261144-8	261144-9
Your Reference	UNITS	BH6	BH7
Depth		0.3-0.4	0.05-0.15
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	98	111

Acid Extractable metals in soil						
Our Reference		261144-1	261144-2	261144-3	261144-4	261144-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	1.5-1.6	0.1-0.2
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	3	5	2	2	4
Copper	mg/kg	31	71	13	<1	21
Lead	mg/kg	330	260	94	4	93
Mercury	mg/kg	4.0	1.2	<0.1	<0.1	0.2
Nickel	mg/kg	2	5	1	1	3
Zinc	mg/kg	100	260	32	2	81

Acid Extractable metals in soil						
Our Reference		261144-6	261144-7	261144-8	261144-9	261144-10
Your Reference	UNITS	BH5	BH5	BH6	BH7	BH7
Depth		0.05-0.15	0.3-0.4	0.3-0.4	0.05-0.15	0.4-0.5
Date Sampled		03/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	5	5	3	3
Copper	mg/kg	21	16	8	120	3
Lead	mg/kg	140	73	12	67	10
Mercury	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Nickel	mg/kg	2	2	6	14	<1
Zinc	mg/kg	140	240	8	72	2

Acid Extractable metals in soil				
Our Reference		261144-11	261144-15	261144-16
Your Reference	UNITS	BD1/20210203	BH1 - [TRIPLICATE]	BH7 - [TRIPLICATE]
Depth		-	0.5-0.6	0.05-0.15
Date Sampled		03/02/2021	01/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021
Arsenic	mg/kg	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	2	3	3
Copper	mg/kg	14	25	130
Lead	mg/kg	120	640	94
Mercury	mg/kg	<0.1	2.9	0.3
Nickel	mg/kg	1	2	16
Zinc	mg/kg	32	95	110

Misc Soil - Inorg						
Our Reference		261144-1	261144-2	261144-3	261144-5	261144-6
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	0.1-0.2	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	09/02/2021	09/02/2021	09/02/2021	09/02/2021	09/02/2021
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg			
Our Reference		261144-8	261144-9
Your Reference	UNITS	BH6	BH7
Depth		0.3-0.4	0.05-0.15
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date prepared	-	09/02/2021	09/02/2021
Date analysed	-	09/02/2021	09/02/2021
Total Phenolics (as Phenol)	mg/kg	<5	<5

Moisture						
Our Reference		261144-1	261144-2	261144-3	261144-4	261144-5
Your Reference	UNITS	BH1	BH2	BH3	BH3	BH4
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	1.5-1.6	0.1-0.2
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	9/02/2021	9/02/2021	9/02/2021	9/02/2021	9/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Moisture	%	6.8	16	7.0	3.0	7.1

Moisture						
Our Reference		261144-6	261144-7	261144-8	261144-9	261144-10
Your Reference	UNITS	BH5	BH5	BH6	BH7	BH7
Depth		0.05-0.15	0.3-0.4	0.3-0.4	0.05-0.15	0.4-0.5
Date Sampled		03/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	9/02/2021	9/02/2021	9/02/2021	9/02/2021	9/02/2021
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Moisture	%	11	9.8	8.3	10	10

Moisture		
Our Reference		261144-11
Your Reference	UNITS	BD1/20210203
Depth		-
Date Sampled		03/02/2021
Type of sample		SOIL
Date prepared	-	9/02/2021
Date analysed	-	10/02/2021
Moisture	%	3.0

Asbestos ID - soils						
Our Reference		261144-1	261144-2	261144-3	261144-5	261144-6
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.5-0.6	0.1-0.2	0.2.-0.3	0.1-0.2	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date analysed	-	10/02/2021	10/02/2021	10/02/2021	10/02/2021	10/02/2021
Sample mass tested	g	Approx. 40g	Approx. 35g	Approx. 40g	Approx. 40g	Approx. 40g
Sample Description	-	Brown fine-grained soil & rocks	Black coarse-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Grey fine-grained soil & rocks
Asbestos ID in soil	-	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

Asbestos ID - soils			
Our Reference		261144-8	261144-9
Your Reference	UNITS	BH6	BH7
Depth		0.3-0.4	0.05-0.15
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date analysed	-	10/02/2021	10/02/2021
Sample mass tested	g	Approx. 35g	Approx. 45g
Sample Description	-	Brown fine-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	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

Misc Inorg - Soil			
Our Reference		261144-3	261144-10
Your Reference	UNITS	BH3	BH7
Depth		0.2.-0.3	0.4-0.5
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date prepared	-	10/02/2021	10/02/2021
Date analysed	-	11/02/2021	11/02/2021
pH 1:5 soil:water	pH Units	7.8	7.5

CEC			
Our Reference		261144-3	261144-10
Your Reference	UNITS	BH3	BH7
Depth		0.2.-0.3	0.4-0.5
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
Date prepared	-	11/02/2021	11/02/2021
Date analysed	-	11/02/2021	11/02/2021
Exchangeable Ca	meq/100g	1	4.0
Exchangeable K	meq/100g	<0.1	0.1
Exchangeable Mg	meq/100g	0.14	0.79
Exchangeable Na	meq/100g	<0.1	<0.1
Cation Exchange Capacity	meq/100g	1.2	4.9

VOCs in water			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	10/02/2021	10/02/2021
Date analysed	-	11/02/2021	11/02/2021
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	<10	<10
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	<1	<1
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	<1
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	<1
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1

VOCs in water			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Ethylbenzene	µg/L	<1	<1
Bromoform	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	116	116
Surrogate toluene-d8	%	98	99
Surrogate 4-BFB	%	98	96

vTRH(C6-C10)/BTEXN in Water				
Our Reference		261144-12	261144-13	261144-14
Your Reference	UNITS	BH1M	BH6M	BD1/20210205
Depth		-	-	-
Date Sampled		05/02/2021	05/02/2021	05/02/2021
Type of sample		water	water	water
Date extracted	-	10/02/2021	10/02/2021	10/02/2021
Date analysed	-	11/02/2021	11/02/2021	11/02/2021
TRH C_6 - C_9	µg/L	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	116	116	117
Surrogate toluene-d8	%	98	99	99
Surrogate 4-BFB	%	98	96	97

svTRH (C10-C40) in Water				
Our Reference		261144-12	261144-13	261144-14
Your Reference	UNITS	BH1M	BH6M	BD1/20210205
Depth		-	-	-
Date Sampled		05/02/2021	05/02/2021	05/02/2021
Type of sample		water	water	water
Date extracted	-	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021	11/02/2021
TRH C_{10} - C_{14}	µg/L	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	64	75	81

PAHs in Water - Trace Level			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021
Naphthalene	µg/L	<0.02	<0.02
Acenaphthylene	µg/L	<0.01	<0.01
Acenaphthene	µg/L	<0.01	<0.01
Fluorene	µg/L	<0.01	<0.01
Phenanthrene	µg/L	<0.01	<0.01
Anthracene	µg/L	<0.01	<0.01
Fluoranthene	µg/L	<0.01	<0.01
Pyrene	µg/L	<0.01	<0.01
Benzo(a)anthracene	µg/L	<0.01	<0.01
Chrysene	µg/L	<0.01	<0.01
Benzo(b,j+k)fluoranthene	µg/L	<0.02	<0.02
Benzo(a)pyrene	µg/L	<0.01	<0.01
Dibenzo(a,h)anthracene	µg/L	<0.01	<0.01
Indeno(1,2,3-c,d)pyrene	µg/L	<0.01	<0.01
Benzo(g,h,i)perylene	µg/L	<0.01	<0.01
Benzo(a)pyrene TEQ	µg/L	<0.05	<0.05
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	84	70

Speciated Phenols in water			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021
Phenol	µg/L	<1	<1
2-Chlorophenol	µg/L	<1	<1
4-Chloro-3-Methylphenol	µg/L	<5	<5
2-Methylphenol (0-Cresol)	µg/L	<1	<1
3/4-Methylphenol (m/p-Cresol)	µg/L	<2	<2
2-Nitrophenol	µg/L	<1	<1
2,4-Dimethylphenol	µg/L	<1	<1
2,4-Dichlorophenol	µg/L	<1	<1
2,6-Dichlorophenol	µg/L	<1	<1
2,4,5-Trichlorophenol	µg/L	<1	<1
2,4,6-Trichlorophenol	µg/L	<1	<1
2,4-Dinitrophenol	µg/L	<20	<20
4-Nitrophenol	µg/L	<20	<20
2346-Tetrachlorophenol	µg/L	<1	<1
2-methyl-4,6-Dinitrophenol	µg/L	<10	<10
Pentachlorophenol	µg/L	<5	<5
Surrogate 2-fluorophenol	%	45	20
Surrogate Phenol-d_6	%	28	22
Surrogate 2,4,6-Tribromophenol	%	92	72
Surrogate *p*-Terphenyl-d_{14}	%	84	70

HM in water - dissolved				
Our Reference		261144-12	261144-13	261144-14
Your Reference	UNITS	BH1M	BH6M	BD1/20210205
Depth		-	-	-
Date Sampled		05/02/2021	05/02/2021	05/02/2021
Type of sample		water	water	water
Date prepared	-	09/02/2021	09/02/2021	09/02/2021
Date analysed	-	09/02/2021	09/02/2021	09/02/2021
Arsenic-Dissolved	µg/L	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	0.4	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	19	80	2
Lead-Dissolved	µg/L	<1	17	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	3	13	2
Zinc-Dissolved	µg/L	37	190	11

OCPs in Water - Trace Level			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021
alpha-BHC	µg/L	<0.001	<0.001
HCB	µg/L	<0.001	<0.001
beta-BHC	µg/L	<0.001	<0.001
gamma-BHC	µg/L	<0.001	<0.001
Heptachlor	µg/L	<0.001	<0.001
delta-BHC	µg/L	<0.001	<0.001
Aldrin	µg/L	<0.001	<0.001
Heptachlor Epoxide	µg/L	0.009	<0.001
gamma-Chlordane	µg/L	<0.001	<0.001
alpha-Chlordane	µg/L	<0.001	<0.001
Endosulfan I	µg/L	<0.002	<0.002
pp-DDE	µg/L	<0.001	<0.001
Dieldrin	µg/L	0.073	<0.001
Endrin	µg/L	<0.001	<0.001
Endosulfan II	µg/L	<0.002	<0.002
pp-DDD	µg/L	<0.001	<0.001
Endrin Aldehyde	µg/L	<0.001	<0.001
pp-DDT	µg/L	<0.001	<0.001
Endosulfan Sulphate	µg/L	<0.001	<0.001
Methoxychlor	µg/L	<0.001	<0.001
Surrogate TCMX	%	78	70

OP in water Trace ANZECCF/ADWG			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021
Dichlorovos	µg/L	<0.2	<0.2
Dimethoate	µg/L	<0.15	<0.15
Diazinon	µg/L	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.2	<0.2
Methyl Parathion	µg/L	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2
Malathion	µg/L	<0.05	<0.05
Chlorpyriphos	µg/L	<0.009	<0.009
Parathion	µg/L	<0.004	<0.004
Bromophos ethyl	µg/L	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02
Surrogate TCMX	%	78	77

PCBs in Water - Trace Level			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date extracted	-	09/02/2021	09/02/2021
Date analysed	-	11/02/2021	11/02/2021
Aroclor 1016	µg/L	<0.01	<0.01
Aroclor 1221	µg/L	<0.01	<0.01
Aroclor 1232	µg/L	<0.01	<0.01
Aroclor 1242	µg/L	<0.01	<0.01
Aroclor 1248	µg/L	<0.01	<0.01
Aroclor 1254	µg/L	<0.01	<0.01
Aroclor 1260	µg/L	<0.01	<0.01
Surrogate TCMX	%	86	127

Cations in water Dissolved			
Our Reference		261144-12	261144-13
Your Reference	UNITS	BH1M	BH6M
Depth		-	-
Date Sampled		05/02/2021	05/02/2021
Type of sample		water	water
Date digested	-	09/02/2021	09/02/2021
Date analysed	-	09/02/2021	09/02/2021
Calcium - Dissolved	mg/L	12	3.0
Magnesium - Dissolved	mg/L	2.2	6.5
Hardness	mgCaCO 3 /L	39	34

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.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
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	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-021	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.

Method ID	Methodology Summary
Org-022/025	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS/GC-MSMS. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-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	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.
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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
TRH C_6 - C_9	mg/kg	25	Org-023	<25	1	<25	<25	0	92	81
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25	1	<25	<25	0	92	81
Benzene	mg/kg	0.2	Org-023	<0.2	1	<0.2	<0.2	0	93	84
Toluene	mg/kg	0.5	Org-023	<0.5	1	<0.5	<0.5	0	85	75
Ethylbenzene	mg/kg	1	Org-023	<1	1	<1	<1	0	90	78
m+p-xylene	mg/kg	2	Org-023	<2	1	<2	<2	0	96	83
o-Xylene	mg/kg	1	Org-023	<1	1	<1	<1	0	85	74
naphthalene	mg/kg	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	84	1	84	84	0	83	75

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-023	[NT]	9	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-023	[NT]	9	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-023	[NT]	9	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-023	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-023	[NT]	9	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-023	[NT]	9	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-023	[NT]	9	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-023	[NT]	9	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-023	[NT]	9	81	74	9	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			09/02/2021	1	10/02/2021	10/02/2021		09/02/2021	09/02/2021
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50	1	<50	<50	0	120	118
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100	1	1700	1800	6	92	127
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100	1	990	1100	11	77	#
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	<50	1	<50	64	25	120	118
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	<100	1	2400	2700	12	92	127
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	<100	1	490	560	13	77	#
Surrogate o-Terphenyl	%		Org-020	97	1	#	#		102	#

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		09/02/2021	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		09/02/2021	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-020	[NT]	9	87	71	20	128	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-020	[NT]	9	5900	5100	15	92	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-020	[NT]	9	3000	2700	11	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-020	[NT]	9	280	250	11	128	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-020	[NT]	9	7500	6600	13	92	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-020	[NT]	9	1000	1100	10	92	[NT]
Surrogate o-Terphenyl	%		Org-020	[NT]	9	#	#		95	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
Naphthalene	mg/kg	0.1	Org-022/025	<0.1	1	2.1	1.3	47	94	123
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1	1	1.6	1.5	6	79	91
Fluorene	mg/kg	0.1	Org-022/025	<0.1	1	2.3	1.7	30	95	#
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1	1	77	84	9	75	#
Anthracene	mg/kg	0.1	Org-022/025	<0.1	1	20	18	11	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1	1	130	110	17	75	#
Pyrene	mg/kg	0.1	Org-022/025	<0.1	1	130	110	17	79	#
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	11	8.8	22	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	<0.1	1	5.3	5.7	7	112	#
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2	1	99	86	14	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05	1	67	56	18	88	#
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1	1	30	26	14	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1	1	12	10	18	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1	1	36	32	12	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	78	1	126	91	32	82	77

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-022/025	[NT]	9	3.8	4.0	5	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-022/025	[NT]	9	2.5	2.7	8	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-022/025	[NT]	9	<1	<1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-022/025	[NT]	9	11	11	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-022/025	[NT]	9	160	130	21	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-022/025	[NT]	9	36	39	8	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-022/025	[NT]	9	290	240	19	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-022/025	[NT]	9	290	250	15	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	[NT]	9	200	170	16	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-022/025	[NT]	9	140	120	15	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	[NT]	9	230	220	4	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	[NT]	9	130	110	17	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	[NT]	9	64	61	5	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	[NT]	9	35	26	30	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	[NT]	9	75	70	7	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	[NT]	9	90	105	15	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
alpha-BHC	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	96	94
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	89	83
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	103	95
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	70	81
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	90	128
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	85	72
Dieldrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	115	127
Endrin	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	84	118
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	90	91
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	82	67
Methoxychlor	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	96	1	119	108	10	102	93

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	9	111	117	5	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
Dichlorvos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	90
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]
Chlorpyriphos-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	77
Fenitrothion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	75	81
Malathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	102	120
Chlorpyriphos	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	95	115
Parathion	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	82	114
Bromophos-ethyl	mg/kg	0.1	Org-022	<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	105	123
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	96	1	119	108	10	102	93

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-022	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-022/025	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	[NT]	9	111	117	5	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date extracted	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
Aroclor 1016	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	90	60
Aroclor 1260	mg/kg	0.1	Org-021	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	96	1	119	108	10	102	93

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-021	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-021	[NT]	9	111	117	5	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date prepared	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			10/02/2021	1	10/02/2021	10/02/2021		10/02/2021	10/02/2021
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	105	111
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	104	102
Chromium	mg/kg	1	Metals-020	<1	1	3	2	40	103	106
Copper	mg/kg	1	Metals-020	<1	1	31	26	18	102	101
Lead	mg/kg	1	Metals-020	<1	1	330	180	59	102	109
Mercury	mg/kg	0.1	Metals-021	<0.1	1	4.0	3.4	16	117	#
Nickel	mg/kg	1	Metals-020	<1	1	2	3	40	106	102
Zinc	mg/kg	1	Metals-020	<1	1	100	80	22	109	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	9	09/02/2021	09/02/2021		[NT]	[NT]
Date analysed	-			[NT]	9	10/02/2021	10/02/2021		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	9	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	9	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	9	3	3	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	9	120	82	38	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	9	67	73	9	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	9	0.4	0.4	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	9	14	8	55	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	9	72	54	29	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-2
Date prepared	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Date analysed	-			09/02/2021	1	09/02/2021	09/02/2021		09/02/2021	09/02/2021
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	102	103

QUALITY CONTROL: Misc Inorg - Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	261144-10
Date prepared	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	11/02/2021
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	11/02/2021
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	99	102
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	103	103
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	98	105
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	92	96

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			10/02/2021	[NT]	[NT]	[NT]	[NT]	10/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Dichlorodifluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
2,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
1,1,1-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
1,1-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Bromodichloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
1,2-dibromoethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	112	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	108	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			10/02/2021	[NT]	[NT]	[NT]	[NT]	10/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	100	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	108	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-020	75	[NT]	[NT]	[NT]	[NT]	72	[NT]

QUALITY CONTROL: PAHs in Water - Trace Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Naphthalene	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	72	[NT]
Acenaphthylene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	84	[NT]
Fluorene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	106	[NT]
Phenanthrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	74	[NT]
Anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	82	[NT]
Pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	82	[NT]
Benzo(a)anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	82	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	80	[NT]
Dibenzo(a,h)anthracene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	83	[NT]	[NT]	[NT]	[NT]	80	[NT]

QUALITY CONTROL: Speciated Phenols in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Phenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	26	[NT]
2-Chlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	30	[NT]
4-Chloro-3-Methylphenol	µg/L	5	Org-022/025	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-Methylphenol (0-Cresol)	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	52	[NT]
3/4-Methylphenol (m/p-Cresol)	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-Nitrophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dimethylphenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dichlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,6-Dichlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	72	[NT]
2,4,5-Trichlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4,6-Trichlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2,4-Dinitrophenol	µg/L	20	Org-022/025	<20	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-Nitrophenol	µg/L	20	Org-022/025	<20	[NT]	[NT]	[NT]	[NT]	44	[NT]
2346-Tetrachlorophenol	µg/L	1	Org-022/025	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-methyl-4,6-Dinitrophenol	µg/L	10	Org-022/025	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Pentachlorophenol	µg/L	5	Org-022/025	<5	[NT]	[NT]	[NT]	[NT]	84	[NT]
Surrogate 2-fluorophenol	%		Org-022/025	59	[NT]	[NT]	[NT]	[NT]	57	[NT]
Surrogate Phenol-d_6	%		Org-022/025	39	[NT]	[NT]	[NT]	[NT]	42	[NT]
Surrogate 2,4,6-Tribromophenol	%		Org-022/025	83	[NT]	[NT]	[NT]	[NT]	76	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022/025	83	[NT]	[NT]	[NT]	[NT]	80	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	116	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[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	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
alpha-BHC	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	86	[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]	78	[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]	74	[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]	80	[NT]
Heptachlor Epoxide	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	80	[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]	90	[NT]
Dieldrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Endrin	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	86	[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]	82	[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]	76	[NT]
Methoxychlor	µg/L	0.001	Org-022/025	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	85	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: OP in water Trace ANZECCF/ADWG						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Dichlorovos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	74	[NT]
Dimethoate	µg/L	0.15	Org-022/025	<0.15	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methyl Parathion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	88	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	70	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	106	[NT]
Chlorpyriphos	µg/L	0.009	Org-022/025	<0.009	[NT]	[NT]	[NT]	[NT]	80	[NT]
Parathion	µg/L	0.004	Org-022/025	<0.004	[NT]	[NT]	[NT]	[NT]	70	[NT]
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	70	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	85	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: PCBs in Water - Trace Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			11/02/2021	[NT]	[NT]	[NT]	[NT]	11/02/2021	[NT]
Aroclor 1016	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	128	[NT]
Aroclor 1260	µg/L	0.01	Org-021	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-021	85	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Date analysed	-			09/02/2021	[NT]	[NT]	[NT]	[NT]	09/02/2021	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	101	[NT]

Result Definitions

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

Quality Control Definitions

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

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.

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

Asbestos: A portion of the supplied samples were sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that these sub-samples are indicative of the entire sample.
Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples requested for asbestos testing were sub-sampled from jars provided by the client.

TRH_S_NEPM:# Percent recovery for the surrogate/matrix spike is not possible to report as the high concentration of analytes in sample/s 261144-1,1d,2,2ms,6,9,9d have caused interference.

PAHs in Soil - The PQL for samples 261144-1,9 have been raised due to the high concentration of analytes in the samples, resulting in the samples requiring a dilution.

TRH Water(C10-C40) NEPM - Analysis performed out of vials on sample 261144-14 as no amber bottle was received for analysis.

Acid Extractable Metals in Soil:
-The laboratory RPD acceptance criteria has been exceeded for 261144-1 for Pb. Therefore a triplicate result has been issued as laboratory sample number 261144-15.
-The laboratory RPD acceptance criteria has been exceeded for 261144-9 for Ni. Therefore a triplicate result has been issued as laboratory sample number 261144-16.
-# Percent recovery is not possible to report due to the high concentration of the elements in the sample. However an acceptable recovery was obtained for the LCS.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 200333.00	**Suburb:** Edgecliff	**To:**	Envirolab Services
Project Name: Mixed Use development	**Order Number**		12 Ashley Street, Chatswood NSW 2067
Project Manager: D. Walker	**Sampler:** J. Hinchcliff	**Attn:**	
Emails: david.walker@douglaspartners.com.au		**Phone:**	02 9910 6200
Date Required: Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑		**Email:**	sydney@envirolab.com.au
Prior Storage: ☑ Esky ☑ Fridge ☐ Shelved	Do samples contain 'potential' HBM? Yes ☐ No ☑ (If YES, then handle, transport and store in accordance with FPM HAZID)		

Sample ID	depth (m)	Lab ID	Date Sampled	Sample Type (S - soil, W - water)	Container Type (G - glass, P - plastic)	Combo 8a	Combo 3	Combo 11	pH + CEC	OCP+OPP+PCB+PAH TRACE	VOC	Speciated phenols	hardness		Notes/preservation
BH1	0.5-0.6	1	1/2/21	S	G	✓									
BH2	01-02	2	3/2/21			✓									
BH3	0.2-0.3	3	3/2/21			✓			✓						
BH3	1.5-1.6	4	3/2/21				✓								
BH4	0.1-0.2	5	3/2/21			✓									
BH5	0.05-0.15	6	3/2/21			✓									
BH5	0.3-0.4	7	3/2/21				✓								
BH6	0.3-0.4	8	3/2/21			✓									
BH7	0.05-0.15	9	3/2/21			✓									
BH7	0.4-0.5	10	3/2/21				✓		✓						
BD1/20210203		11	3/2/21	↓	↓			✓							
BH1M		12	5/2/21	W	G/P			✓		✓	✓	✓	✓		
BH6M		13	5/2/21	↓	↓			✓		✓	✓	✓	✓		
BD1/20210205		14	5/2/21	↓	↓			✓							
PQL (S) mg/kg														**ANZECC PQLs req'd for all water analytes** ☐	

PQL = practical quantitation limit. If none given, default to Laboratory Method Detection Limit

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No:

Total number of samples in container: **Relinquished by:** DW **Transported to laboratory by:** Courier

Send Results to: Douglas Partners Pty Ltd **Address** 96 Hermitage Road, West Ryde **Phone:** 98090666 **Fax:** 98094095

Signed: Helen **Received by:** [signature] **Date & Time:** 5/2/21 13 04

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

Job No: 261144

SCB0055

Date Received: 5/2/21
Time Received: 13:04
Received By: Helen
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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	Jack Hinchliffe

Sample Login Details

Your reference	200333.00, Edgecliff
Envirolab Reference	261144
Date Sample Received	08/02/2021
Date Instructions Received	08/02/2021
Date Results Expected to be Reported	15/02/2021

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	14 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
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:

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ABN 37 112 535 645
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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils	Misc Inorg - Soil	CEC	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Trace Level	Speciated Phenols in water	HM in water - dissolved	OCPs in Water - Trace Level	OP in water Trace ANZECCF/ADWG	PCBs in Water - Trace Level	Cations in water Dissolved
BH1-0.5-0.6	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH2-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH3-0.2.-0.3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓										
BH3-1.5-1.6	✓	✓	✓				✓														
BH4-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH5-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH5-0.3-0.4	✓	✓	✓				✓														
BH6-0.3-0.4	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH7-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓	✓												
BH7-0.4-0.5	✓	✓	✓				✓			✓	✓										
BD1/20210203	✓	✓					✓														
BH1M												✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BH6M												✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BD1/20210205													✓	✓			✓				

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

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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 261144-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	David Walker
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**200333.00, Edgecliff**
Number of Samples	Additional Testing on 7 Soils
Date samples received	08/02/2021
Date completed instructions received	16/02/2021

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	23/02/2021
Date of Issue	18/02/2021

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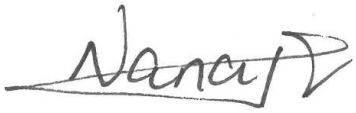
Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
Dragana Tomas, Senior Chemist
Ken Nguyen, Reporting Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

TCLP Preparation - Acid						
Our Reference		261144-A-1	261144-A-2	261144-A-6	261144-A-7	261144-A-9
Your Reference	UNITS	BH1	BH2	BH5	BH5	BH7
Depth		0.5-0.6	0.1-0.2	0.05-0.15	0.3-0.4	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
pH of soil for fluid# determ.	pH units	9.2	8.7	8.6	8.6	8.5
pH of soil TCLP (after HCl)	pH units	1.7	1.7	1.7	1.7	1.7
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.1	5.0	5.0	5.0	5.0

TCLP Preparation - Acid			
Our Reference		261144-A-10	261144-A-11
Your Reference	UNITS	BH7	BD1/20210203
Depth		0.4-0.5	-
Date Sampled		03/02/2021	03/02/2021
Type of sample		SOIL	SOIL
pH of soil for fluid# determ.	pH units	8.3	8.3
pH of soil TCLP (after HCl)	pH units	1.7	1.7
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.0	5.0

Metals in TCLP USEPA1311					
Our Reference		261144-A-1	261144-A-2	261144-A-6	261144-A-11
Your Reference	UNITS	BH1	BH2	BH5	BD1/20210203
Depth		0.5-0.6	0.1-0.2	0.05-0.15	-
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL
Date extracted	-	17/02/2021	17/02/2021	17/02/2021	17/02/2021
Date analysed	-	17/02/2021	17/02/2021	17/02/2021	17/02/2021
Lead in TCLP	mg/L	3.2	0.3	0.43	0.84

PAHs in TCLP (USEPA 1311)						
Our Reference		261144-A-1	261144-A-2	261144-A-6	261144-A-7	261144-A-9
Your Reference	UNITS	BH1	BH2	BH5	BH5	BH7
Depth		0.5-0.6	0.1-0.2	0.05-0.15	0.3-0.4	0.05-0.15
Date Sampled		01/02/2021	03/02/2021	03/02/2021	03/02/2021	03/02/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	17/02/2021	17/02/2021	17/02/2021	17/02/2021	17/02/2021
Date analysed	-	18/02/2021	18/02/2021	18/02/2021	18/02/2021	18/02/2021
Naphthalene in TCLP	mg/L	0.001	<0.001	<0.001	<0.001	0.001
Acenaphthylene in TCLP	mg/L	0.001	<0.001	<0.001	<0.001	0.003
Acenaphthene in TCLP	mg/L	0.001	<0.001	<0.001	<0.001	0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	0.003
Phenanthrene in TCLP	mg/L	0.022	0.004	<0.001	<0.001	0.014
Anthracene in TCLP	mg/L	0.005	0.001	<0.001	<0.001	0.003
Fluoranthene in TCLP	mg/L	0.007	0.001	<0.001	<0.001	0.004
Pyrene in TCLP	mg/L	0.006	0.001	<0.001	<0.001	0.003
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	0.042	0.0072	NIL (+)VE	NIL (+)VE	0.032
Surrogate p-Terphenyl-d14	%	87	82	78	70	83

PAHs in TCLP (USEPA 1311)		
Our Reference		261144-A-10
Your Reference	UNITS	BH7
Depth		0.4-0.5
Date Sampled		03/02/2021
Type of sample		SOIL
Date extracted	-	17/02/2021
Date analysed	-	18/02/2021
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	0.005
Anthracene in TCLP	mg/L	0.001
Fluoranthene in TCLP	mg/L	0.002
Pyrene in TCLP	mg/L	0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	0.0098
Surrogate p-Terphenyl-d14	%	83

Method ID	Methodology Summary
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004. Please note that the mass used may be scaled down from the default based on sample mass available.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-022/025	Leachates are extracted with Dichloromethane and analysed by GC-MS/GC-MSMS.

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	261144-A-2
Date extracted	-			17/02/2021	1	17/02/2021	17/02/2021		17/02/2021	17/02/2021
Date analysed	-			17/02/2021	1	17/02/2021	17/02/2021		17/02/2021	17/02/2021
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	1	3.2	3.0	6	83	88

QUALITY CONTROL: Metals in TCLP USEPA1311					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	17/02/2021	17/02/2021		[NT]	[NT]
Date analysed	-			[NT]	11	17/02/2021	17/02/2021		[NT]	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	[NT]	11	0.84	0.57	38	[NT]	[NT]

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	261144-A-2
Date extracted	-			17/02/2021	1	17/02/2021	17/02/2021		17/02/2021	17/02/2021
Date analysed	-			18/02/2021	1	18/02/2021	18/02/2021		18/02/2021	18/02/2021
Naphthalene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.001	<0.001	0	100	72
Acenaphthylene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.001	<0.001	0	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.001	0.001	0	80	84
Fluorene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	75	73
Phenanthrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.022	0.016	32	80	98
Anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.005	0.004	22	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.007	0.005	33	76	89
Pyrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	0.006	0.005	18	79	92
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	90	102
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-022/025	<0.002	1	<0.002	<0.002	0	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	80	87
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-022/025	<0.001	1	<0.001	<0.001	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	107	1	87	89	2	89	94

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.

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

Metals in TCLP USEPA1311 - The duplicate result is greater than the acceptable RPD. The RPD for duplicate results is accepted due to the inhomogeneous nature of the sample/s.

Envirolab Services Pty Ltd
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ph 02 9910 6200 fax 02 9910 6201
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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	David Walker

Sample Login Details

Your reference	200333.00, Edgecliff
Envirolab Reference	261144-A
Date Sample Received	08/02/2021
Date Instructions Received	16/02/2021
Date Results Expected to be Reported	23/02/2021

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	Additional Testing on 7 Soils
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
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:

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Sample ID	TCLP Preparation - Acid	Metals in TCLP USEPA1311	Naphthalene in TCLP	Acenaphthylene in TCLP	Acenaphthene in TCLP	Fluorene in TCLP	Phenanthrene in TCLP	Anthracene in TCLP	Fluoranthene in TCLP	Pyrene in TCLP	Benzo(a)anthracene in TCLP	Chrysene in TCLP	Benzo(b)k)fluoranthene in TCLP	Benzo(a)pyrene in TCLP	Indeno(1,2,3-c,d)pyrene - TCLP	Dibenzo(a,h)anthracene in TCLP	Benzo(g,h,i)perylene in TCLP	Total +vePAH's	Surrogate p-Terphenyl-d14	On Hold
BH1-0.5-0.6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH3-0.2.-0.3																				✓
BH3-1.5-1.6																				✓
BH4-0.1-0.2																				✓
BH5-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH5-0.3-0.4	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH6-0.3-0.4																				✓
BH7-0.05-0.15	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH7-0.4-0.5	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BD1/20210203	✓	✓																		
BH1M																				✓
BH6M																				✓
BD1/20210205																				✓
BH1 - [TRIPLICATE]-0.5-0.6																				✓
BH7 - [TRIPLICATE]-0.05-0.15																				✓

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

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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.