Douglas Partners
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Report on
Limited Detailed Site (Contamination) Investigation

Proposed Multi-Trades and Digital Technology Hub
TAFE NSW Meadowbank Campus
See Street, Meadowbank

Prepared for
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1. Introduction

This report presents the results of a limited detailed site (contamination) investigation (DSI) undertaken for a proposed new multi trades and digital technology hub as part of the TAFE NSW Meadowbank Campus future development, located on See Street, Meadowbank. The proposed development area (the site), labelled "current site boundary" is shown on Drawing 1, Appendix A. The construction of the new multi trades and digital technology hub will include a six storey building over basement car parking. Whilst no detailed plans were available at the time of reporting, bulk excavation to depths in the range of 3 m to 9 m are possible over virtually the entire development footprint.

The investigation was commissioned by TAFE NSW and was undertaken in accordance with the Douglas Partners Pty Ltd (DP) proposal SYD190020 dated 11 January 2019.

Greencap undertook a desktop preliminary site investigation (PSI) in 2018 on the entire Meadowbank campus which includes the current site and recommended a detailed site investigation including groundwater assessment, prior to any future development.

The primary objective of the limited DSI was to assess the suitability of the site for the proposed development and to further identify contamination (or potential contamination) issues that require remediation or management as part of the proposed development. The limited DSI also presents a preliminary waste classification assessment to assist in budgeting for the disposal of surplus soils created as a result of the proposed development.

The limited DSI is undertaken with reference to the following primary documents:

- NSW EPA (2011) *Guidelines for Consultants Reporting on Contaminated Sites*, and
- NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013*.

The fieldwork for the DSI was conducted in conjunction with a geotechnical investigation reported under DP Report 86469.05.R.001.

2. Scope of Work

The scope of work for this limited DSI comprised:

- A review of relevant reports prepared for the site and adjacent areas within the campus, as relevant;
- A review of published geological, soils, acid sulphate soils and hydrogeological maps;

- A review of Dial Before You Dig Plans and undertake service location to identify underground services;
- Drilling of seven boreholes (BH1 to BH7) with a truck mounted drill rig;
- Collection of soil samples at regular depth intervals or upon signs of contamination;
- Installation of standpipes into two of the boreholes to permit sampling of groundwater and measurement of water levels;
- Screening of samples collected with a photo – ionisation detector (PID) to assess the likely presence or absence of volatile organic compounds;
- Analysis of selected soil samples at a NATA accredited laboratory for various combinations of the following:
    - Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc);
    - Total recoverable hydrocarbons (TRH); o Benzene, toluene, ethylbenzene and total xylenes (BTEX);
    - Polycyclic aromatic hydrocarbons (PAH);
    - Phenols;
    - Organochlorine pesticides (OCP);
    - Organophosphorus pesticides (OPP);
    - Polychlorinated biphenyls (PCB); and
    - Asbestos (40g sample for initial screen).
- Collection of groundwater samples for contamination testing from the two groundwater monitoring wells;
- Analysis of water samples for metals, PAH, TRH, BTEX, OCP, OPP, PCB and phenols;
- Analysis of one intra-laboratory soil replicate for metals, TRH, BTEX, one trip blank sample for BTEX and one trip spike sample for BTEX; and
- The preparation of this DSI report.

3. Site Information

3.1 Site Identification and Description

The site is part of Lot 11 Deposited Plan 1232584. The proposed Multi Trades and Digital Technology Hub site is located with the boundaries of the Meadowbank TAFE and is a roughly trapezoidal shaped area with plan dimensions of some 90 m by 80 m as shown on Drawings 1 and 2 in Appendix A. The site occupies an area of approximately 7,900 m^2. The site is bounded to the south east by See Street the north east by an electricity substation (Photograph 3), the south west and north-west by existing single multistorey TAFE buildings.

The local government authority is Ryde Council.

At the time of the investigation, the site was asphalt surfaced on-grade carpark with numerous large eucalypts around the perimeter and between designated carparking areas (Photographs 1 and 2). A child care centre was located in the southern corner of the site. The site surface levels fall from See Street at approximately reduced level RL 24 m relative to the Australian Height Datum (AHD) to the west with the north western boundary at approximately RL 16 m AHD.

3.2 Geology, Topography and Hydrogeology

Reference to the Sydney 1:100 000 Geological Sheet indicates that the site is underlain by Hawkesbury Sandstone of Triassic Age. The Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone, very minor shale and laminite lenses. The See Street boundary is close to a geological boundary with Ashfield Shale which comprises black to dark-grey shale and laminite.

Reference to the Sydney Soil Landscape 1:100 000 Map Sheet the site is within an area of Lucas Heights soil. This soil type is characterised by moderately hard setting Yellow Podzolic Soils and Yellow Soloths, and Yellow Earths on outer edges of crests.

The NSW Acid Sulphate Soil (ASS) Risk Map indicates that the site is not within an area of known acid sulfate soil occurrence.

A search of the NSW Department of Primary Industries Office of Water database was undertaken for water bearing bores within a 500 m radius of the site. Three registered groundwater bores were identified within the 500 m radius of the site. These bores were registered for monitoring purposes. Shallow standing water level was reported in the range 2-4 m below ground level (bgl).

Based on regional topography, groundwater flow directions are expected to flow to the south, towards Parramatta River, while surface water is likely to discharge to the unnamed creek on the western campus boundary and flow via Charity Creek ultimately to the Parramatta River.

4. Review of Previous Reports

4.1 Summary of PSI (Greencap, 2018)

As part of the limited DSI, the Greencap 2018 *Report on Preliminary Site Investigation, Meadowbank Campus- See Street, Meadowbank NSW,* Report J154876 dated 10 October 2018 (Greencap, 2018) was reviewed and is summarised below.

Greencap (2018) comprised of a desktop review of the entire TAFE campus which includes the current site to assess the potential for contamination at the site. A site walkover, review of historical aerial photographs, regulatory notice search, SafeWork NSW Records search, historical title deeds search, and review of the council Section 10.7(2) planning certificate was undertaken.

The walkover undertaken by Greencap identified the following pertinent features of the campus:

- The site consists of 32 buildings, including multi story buildings, sheds, demountable buildings and warehouses. The footprint of the buildings cover approximately 40% of the site, an additional 20% is covered in hardstand including footpaths, car parking and small internal roads. The remainder of the site is covered in grass, garden beds and a small amount of dense vegetation;
- The buildings generally consist of seminar rooms, educational spaces, industrial skills workshops, administration offices, utilities and amenities;
- Anecdotal information provided during the site walkover indicated that the site was previously used for military use in the past;
- On the western boundary, adjacent the train line, a small ravine was identified covered in dense vegetation. A small amount of waste was identified in the vegetation area. A small creek at the base of the ravine was identified running north to south, the feeder for the creek was not identified indicating it was a stormwater channel;
- Chemical stores were identified in multiple spaces across the site;
- Waste bins and skip bins were identified in various locations across the site, all bins were well maintained;
- There was no visual evidence of underground storage tanks (e.g. fill points, dip points, breather lines) or above ground storage tanks observed;
- There was no visual evidence of potential asbestos containing materials (ACM) observed on the surface of the site or within the structures;
- There was no visual evidence of phytotoxic impact (i.e. plant stress or dieback) observed on the site;
- There was no olfactory evidence of contamination detected on the site; and
- There was no visual evidence of surface staining observed on the site.

Within the general area of the campus, the following potential sources of contamination were identified:

- A power sub-station is located on the north-eastern boundary of the site;
- Meadowbank train station and train line is located on the western boundary;
- Multiple mechanics/smash repairs 15 m north of the site; and
- Sydney water treatment facility 25 m north of site.

Within 500 m of the site four petrol stations were identified:

- BP Petrol Station, 220 m north-west of site;
- Caltex West Ryde Petrol Station, 230 m north of site;
- Speedway Petrol Station, 280 m north of site; and
- 7/11 Petrol Station, 390 m north of site.

Within 500 m of the site three laundry services were identified:

- Meadowbank Laundry 35 m south of site;
- Neat and Fit Dry Cleaner, 277 m south of site; and
- Elegance Dry Cleaning, 290 m south of site.

A review of the site history and relevant searches indicated the campus site previously consisted of multiple smaller lots that were used for industrial, educational and residential use. The majority of the site was owned by a company that manufactured agricultural machinery in the 1930s, their warehouses were demolished before 1943. The land was acquired under the Public Work Act 1981 on behalf of the Minister for Public Instruction. Anecdotal evidence ideates that the site was used as a military based during the world war, a large portion of the site was clear of development between 1943 and 1951. Multiple residential buildings were located on the eastern boundary of the campus prior to 1986; the buildings were demolished following the Minister of Education acquiring properties in the late 1970s. The lot was fully acquired by the Minister of Education and the Minister Administering the Technical and Further Education in 2016.

The campus was not reported to be on any NSW EPA published databases, had no record of the storage of hazardous chemicals on the current investigation site and not declared in the planning certificates to be significantly contaminated or subject to any management order. There were however numerous depots with licenced goods stored across the TAFE campus. No evidence, either from the Dangerous Goods search, site walkover or other, indicated the presence of any historical or current Underground Storage Tanks (UST) or Above ground Storage Tanks (AST) used for petroleum fuel storage. No dangerous goods storage was noted for the current site.

The most significant risks associated with contamination at the campus were considered by Greencap to be associated military use, chemical storage, historical filling and manufacturing. The most significant off-site risks were considered by Greencap to be associated with the adjoining sub-station, the water treatment facility further north, and the adjoining train line. Contaminants of concern were identified as metals, hydrocarbons, pesticides, solvents, volatile compounds and asbestos.

The report states that a *detailed site assessment is recommended across the full site prior to future development or utility works involving disturbance of site soils*.

4.2 Review of Other Reports

The following previous reports by DP, for the southern portion of the TAFE campus (investigation area) have been reviewed to provide an understanding of the local groundwater conditions and the potential contaminants of concern, that may also be present on the site (e.g. fill).

Previous reports reviewed:

- DP *Report on Detailed Site Investigation, TAFE NSW Meadowbank Campus, See Street, Meadowbank,* Report 86469.01.R.001.Rev1 dated 3 August 2018 (DP, 2018a);
- DP *Remediation Action Plan, Proposed Lift and Stores Building, See Street, Meadowbank,* Report 84549.02.R001.DftA dated 28 August 2018 (the 'RAP') (DP, 2018b); and

- *DP Report on Geotechnical Investigation Proposed Lift and Stores Building prepared for TAFE NSW, Project 86469.01 dated 3 August 2018 (DP, 2018c).*

DP, 2018a

DP undertook a detailed site investigation (DSI) for contamination, which included a review of the history information, a walkover, intrusive investigation, laboratory analysis and reporting. During the walkover, the environmental scientist reportedly noticed flammable liquids stores were present within or close to the investigation areas, no underground tanks were identified. With regards to the surrounding land, a number of residential properties to the north east have been resumed, as well as the installation of an electrical substation. A number of service stations, motor garages and laundromats had been identified nearby, however these are hydraulically down gradient and are thus unlikely to have had an impact on the investigation area.

Fieldwork comprised contamination sampling from 16 shallow boreholes. Potential asbestos containing material (ACM) was not observed in the soil whilst sampling. It was however, noted that trace building rubble was observed in the filling at two of the bores and asbestos contamination can sometimes be associated with building rubble in filling.

Laboratory analysis of soil samples was undertaken for metals, TRH, BTEX, PAH, OCP, OPP, phenols and asbestos. The laboratory results recorded exceedances of the site assessment criteria (SAC) in fill at a number of bore locations for lead, benzo(a)pyrene TEQ, TRH, copper, nickel and zinc. Chrysotile asbestos was detected in a fragment recovered from one of the bores.

DP provided the following hypothesis relating to the observed exceedances:

'The lead, benzo(a)pyrene and asbestos exceedances reported above are associated with generally deeper fill profiles in Areas 2 and 3 and are likely to be sourced from the fill. Those concentrations reported to be exceeding EIL or ESL are not considered significant and can generally be managed through the selection of appropriate plant species, if new plantings are proposed.'

The DSI report recommended the preparation and implementation of a remediation action plan (RAP) for the investigation area.

DP, 2018b

The objective of the RAP was to outline procedures to remove and/or to mitigate associated risks of potential environmental and human health impacts posed by the contaminated material such that the site can be rendered suitable for the proposed development. The following areas were identified as requiring remediation:

- Delineation of the contamination exceeding health based levels; and/or
- Excavation and off-site disposal of the contamination exceeding health based levels; and/or
- Onsite retention and, where required, capping, of the contamination exceeding health based levels.

An EMP was to be developed as part of the final validation process, which will be used as an instrument to manage the integrity of a physical barrier system (if adopted as the remediation

approach) and protect workers who may become exposed to the contaminated materials in the future, post remediation.

DP, 2018c

DP conducted geotechnical investigation at the four targeted investigation areas that included the drilling of seven boreholes. Dynamic cone penetrometer tests at each borehole and laboratory testing of selected soil samples was also carried out. The geotechnical investigation was conducted in conjunction with the DSI reported in DP (2018a).

5. Conceptual Site Model

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

5.1 Potential Sources

Based on Greencap (2018) report and the reports associated with the adjacent four targeted areas, the following potential sources of contamination and associated contaminants of potential concern (COPC) have been identified for the current site:

S1 Imported fill, previous site uses impacting fill/ surficial soils and demolition of former buildings impacting fill/ surficial soil.

COPC include: heavy metals, TRH, BTEX, PAH, PCB, OCP, OPP, VOC, phenols and asbestos; and

S2 Surrounding site uses (past and present) including flammable liquids stores, existing car parking, sub-station.

COPC include: heavy metals, TRH, PAH, BTEX, PCB, total petroleum hydrocarbons and VOC.

S3 Pest control; Pesticides (such as OCP and OPP) used beneath ground slabs.

5.2 Potential Receptors

- R1 – Future site users (including workers, students and visitors);
- R2 – Future construction workers (for development of the site);
- R3 - Future maintenance workers (post-development);
- R4 – Adjacent land users (including residents and workers in adjacent properties);
- R5 – Surface waters (beyond site boundary);

- R6 – Groundwater; and
- R7 – In ground building structures.

5.2.1 Potential Pathways

Potential pathways for the identified contamination to impact on the receptors include the following:

- P1 – Ingestion and dermal contact with soil;
- P2 – Inhalation of dust;
- P3 – Inhalation of vapours;
- P4 – Leaching of contaminants and vertical migration into groundwater;
- P5 - Lateral migration of groundwater;
- P6 – Direct contact of contaminated ground with in ground structures; and
- P7 – Surface water runoff

5.3 Summary of CSM

A ‘source – pathway – receptor’ approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways. The possible pathways between the above sources (S1 to S3) and receptors (R1 to R7) are provided in Table 1 below.

Table 1: Conceptual Site Model

Source	Transport Pathway	Receptor	Risk Management Action Recommended
S1 Imported fill, previous site uses impacting fill/ surficial soils and demolition of former buildings impacting fill/ surficial soil COPC include: heavy metals, TRH, BTEX, PAH, PCB, OCP, OPP, VOC, phenols and asbestos	P1: Ingestion and dermal contact P2: Inhalation of dust P3: Inhalation of vapours	R1: Future site users R2: Future construction workers R3 : Future maintenance workers	An intrusive investigation to assess possible contamination issues including chemical testing of the soils and groundwater.
	P3: Inhalation of vapours	R4: Adjacent land users	
	P4: Leaching of contaminants and vertical migration into groundwater	R6: Groundwater	
	P5: Lateral migration of groundwater providing base flow to water bodies P7: Surface water runoff	R5:Surface water	
	P6: Contact with contaminated ground	R7: In ground building structures	
S2 Surrounding site uses COPC include: heavy metals, TRH, PAH, BTEX, PCB, total petroleum hydrocarbons and VOC	P1: Ingestion and dermal contact P2: Inhalation of dust P3: Inhalation of vapours	R2: Construction workers	
	P3: Inhalation of vapours	R1: Future site users	
S23 Pest control COPC include: Pesticides (such as OCP and OPP) used beneath ground slabs	P1: Ingestion and dermal contact P2: Inhalation of dust P3: Inhalation of vapours P4: Leaching of contaminants and vertical migration into groundwater P7: Surface water runoff	R1: Future site users R2: Future construction workers R5: Surface water R6: Groundwater	

6. Fieldwork, Analytical Rationale and Method

6.1 Data Quality Objectives and Project Quality Procedures

The limited DSI has been devised broadly in accordance with 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.

An evaluation of the DQO is presented in Appendix C.

6.2 Data Quality Indicators

The performance of the investigation in achieving the DQO was assessed through the application of Data Quality Indicators (DQI), defined as follows:

Precision: A quantitative measure of the variability (or reproducibility) of data;

Accuracy: A quantitative measure of the closeness of reported data to the "true" value;

Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on the site;

Completeness: A measure of the amount of useable data from a data collection activity;

Comparability: The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

An evaluation of the DQI is presented in Appendix C.

6.3 Soil

6.3.1 Sample Locations and Rationale

Table A of the NSW EPA (1995) *Sampling Design Guidelines* recommends a minimum of 18 sampling points for a site of 0.79 ha for site characterisation based on the detection of circular hot spots using a systemic grid sampling pattern. However, given that the proposed development will involve bulk excavation of soils over virtually the entire footprint, the relatively low potential for contamination at the

site, and the limited nature of the intrusive investigation, a total of seven sampling locations were selected to provide reasonable coverage of the site.

6.3.2 Sampling Methodology

The bore drilling was carried out on the 15, 16 and 17 March 2019, and consisted of:

- Setting and scanning for buried services at all borehole locations (BH1 – BH7);
- Drilling of seven boreholes, as shown on Drawing 2, Appendix A, with a bobcat rig and two boreholes (BH2 and BH3) were drilled with hand tools to expose the rock bed (where unknown services were possible). The boreholes drilled using a bobcat drill rig were fitted with solid flight augers; and
- Soil samples were collected for each observed soil type, and at regular depth intervals. Observations were made and recorded on the borehole logs (see Appendix D) for staining, odours and anthropogenic.

All sampling data was recorded on DP's borehole logs. The general sampling procedure adopted for the collection of soil samples was as follows:

- Collection of soil samples from auger returns using disposable sampling equipment;
- Transfer of samples into laboratory-prepared glass jars, completely filled to ensure the headspace within the sample jar was minimised, and capped immediately to minimise loss of volatiles;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- Placement of the glass jars, with Teflon lined lid, into a cooled, insulated and sealed container for transport to the laboratory.

Replicate samples were collected in zip-lock bags for PID screening.

Borehole locations and levels were determined using a differential GPS (DGPS) receiver.

6.3.3 Analytical Rationale

All soil samples that were selected for analysis were from filling (apart from one sample) given that field observations suggested that contamination is more likely to be associated with the filling (and near surface soils) than natural soil.

At least one soil sample from each bore was selected for analysis, with more samples selected where fill was deepest or signs of potential contamination observed.

Samples were analysed for the primary COPC including metals, TRH, BTEX, PAH, OCP, OPP, PCB, phenols and asbestos. Additionally, pH and CEC were analysed on selected samples to determine environmental investigation levels. PID screening was utilised to assess the presence of VOC.

6.4 Monitoring Well Installation and Sampling Details

Groundwater monitoring wells were installed in two boreholes (BH1 and BH5) to depths of between 12 m and 6 m below ground level (bgl), as shown on Drawing 2, Appendix A. The groundwater monitoring wells were installed to measure water levels and evaluate the potential for groundwater contamination. The wells were positioned on the higher and lower elevations of the site to assess groundwater conditions entering the site and leaving the site.

The installed wells were constructed of 50 mm diameter acid washed, class 18, PVC casing and machine slotted well screen intervals. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate the groundwater. The wells were completed with a gravel pack extending above the well screen, a bentonite plug and the backfilled with sand above the bentonite plug and a Gatic cover at the surface.

Well construction details are shown on the borehole logs, Appendix D. the wells were screened from approximately the top of the sandstone bedrock profile to the base of the borehole.

Following installation of groundwater wells, the two wells developed on 20 March 2019 by purging a minimum of three well volumes, or until the well was dry. The purpose of well development was to remove as far as practicable fluid and sediment introduced via drilling and to facilitate connection of the well to the local groundwater regime.

Groundwater sampling was undertaken on 27 March 2019. An interface probe was first used to measure the standing water level (SWL) of the boreholes and also to detect light non-aqueous phase liquids (LNAPL), if present.

Sampling was undertaken using low-flow sampling techniques utilising a peristaltic pump and LDPE tubing. The pumps were set to the lowest possible flow rate that could produce laminar flow. Prior to sampling, field parameters (pH, temperature, dissolved oxygen (DO), conductivity, turbidity (NTU) and redox), which were measured using a calibrated water quality meter, were first allowed to stabilise.

Samples were transferred directly into appropriately preserved bottles, with minimum aeriation. For analysis of metals, the relevant sample fraction was filtered using an in-line disposable 0.45 µm filter that was changed between samples to minimise the risk of cross-contamination.

The sample handling and management comprised the following:

- Sample bottles were labelled with individual and unique identification including project number, Well ID and date of sampling;
- The bottles were placed in an insulated cooler and maintained at a cool temperature using ice until transported to the analytical laboratory, and
- Chain-of-custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

Details of the groundwater sampling are also provided on the groundwater field sheets provided in Appendix D.

6.4.1 Analytical Rationale

The analytical scheme was designed to obtain an indication of the potential presence and extent of the COPC identified in the CSM, being metals, TPH, BTEX, PAH, OPP, OCP, PCB and phenols. PID readings were used to assess the potential for VOC.

The results of the analytical testing were compared with the adopted site assessment criteria (SAC; Section 7).

7. Site Assessment Criteria

The Site Assessment Criteria (SAC) applied in the current investigation is informed by the preliminary conceptual site model which identified receptors to potential contamination (refer to Section 6). Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising investigation levels, screening levels and management limits of Schedule B1 of NEPC, 2013. The NEPC guidelines are endorsed by NSW EPA under the CLM Act 1997.

The investigation levels, screening levels and management limits are applicable to generic land use settings and include consideration of, where relevant, the soil type and the depth of contamination. The investigation and screening levels are not intended to be used as clean up levels. Rather, they establish concentrations above which further appropriate investigation (e.g. Tier 2 assessment) should be undertaken. They are intentionally conservative and are based on a reasonable worst-case scenario.

7.1 Soil

7.1.1 Health Investigation and Screening Levels

The Health Investigation Levels (HIL) and Health Screening Levels (HSL) are scientifically-based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential human health risk from chronic exposure to contaminants.

HIL are applicable to assessing health risk arising via all relevant pathways of exposure for a range of metals and organic substances. The HIL are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions may determine the depth to which HIL apply for other land uses.

HSLs are applicable to selected petroleum compounds and fractions to assess the risk to human health via the inhalation pathway. HSL have been developed in NEPC (2013) for different land uses, soil types and depths to contamination.

The generic HIL and HSL are considered to be appropriate for the assessment of contamination at the site. HIL D and HSL D have been adopted given that proposed for continued use as part of the TAFE, and the proposed bulk excavation of soils (essentially removing all fill) across the site footprint.

As soil types encountered were variable, the most conservative HSL for the different soil types (sand, silt and clay) have been adopted. HSL for a depth of 0 m to < 1 m have been adopted as these are more conservative than those for greater depths.

The adopted HIL and HSL for the COPC are shown in Table 2.

Table 2: HIL and HSL for Soil Contaminants

Contaminant	HIL D (mg/kg)	HSL D for vapour intrusion (mg/kg)
Metals and Inorganics		
Arsenic	3000	-
Cadmium	900	-
Chromium (VI)	3600	-
Copper	240 000	-
Lead	1500	-
Mercury (inorganic)	730	-
Nickel	6000	-
Zinc	400 000	-
Phenols (Pentachlorophenol as initial screen)	660	-
TRH		
$C_6 – C_{10}$ (less BTEX)	-	260
$>C_{10}-C_{16}$ (less Naphthalene)	-	NL
BTEX		
Benzene	-	3
Toluene	-	NL
Ethylbenzene	-	NL
Xylenes	-	230
PAH		
Benzo(a)pyrene TEQ	40	-
Naphthalene	-	NL
Total PAHs	4000	-
OCP		
DDT+DDE+DDD	3600	-
Aldrin + Dieldrin	45	-
Chlordane	530	-
Endosulfan (total)	2000	-
Endrin	100	-
Heptachlor	50	-
HCB	80	-
Methoxychlor	2500	-
OPP		
Chlorpyrifos	2000	-
Other Organics		
PCBs (non dioxin- like PCB only)	7	-

Note: TEQ is Toxic Equivalency Quotient.
NL is 'Not Limiting'. If the derived soil HSL exceeds the soil saturation concentration, 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, the HSL is given as NL.

7.1.2 Ecological Investigation and Screening Levels

Ecological Investigation Levels (EIL) and ecological screening levels (ESL) to be determined in accordance with NEPC (2013), if ultimately deemed appropriate.

Schedule B5A of NEPC (2013) states that the aim *of the EILs is that varying levels of protection will be provided to the following ecological receptors at all sites:*

- *Biota supporting ecological processes, including microorganisms and soil invertebrates;*
- *Native flora and fauna;*
- *Introduced flora and fauna; and*
- *Transitory or permanent wildlife.*

Furthermore, Schedule B5A of NEPC (2013) states that *Commercial and industrial land, particularly in long-established industrial areas, is often heavily contaminated by past activities or fill materials used to level the area. In these cases, jurisdictions may determine that HILs are the most appropriate soil quality criteria and that EILs are not applicable. In many cases, the only generic ecological value for this land use will be 'transitory wildlife'.*

It is noted that the value of the site for soil organisms and the risk of exposure of soil contamination to transitory wildlife are considered very low, given that the commercial / industrial setting; the current hard covered site and surrounding area; and the proposed building and hardstand will occupy the entire site footprint (following bulk excavation of soils).

Therefore, it is considered that human health risk screening levels are more appropriate and EIL and ESL are not relevant to the current assessment.

7.1.3 Management Limits – Petroleum Hydrocarbons

In addition to appropriate consideration and application of the HSL 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 adopted in NEPC (2013) as interim Tier 1 guidance. Management Limits have been derived in NEPC (2013) for the same four petroleum fractions as the HSLs (F1 to F4). The adopted Management Limits, from Table 1B(7), Schedule B1 of NEPC (2013) are shown in Table 13. The following site specific data and assumptions have been used to determine the Management Limits:

- The Management Limits will apply to any depth within the soil profile;

- The Management Limits for commercial and industrial apply; and
- The soils encountered at the site comprised various types including sand and clay. A "coarse" soil texture (being the most conservative soil type) has been adopted.

Table 3: Management Limits

Contaminant	Management Limit – Commercial / Industrial (mg/kg)
TRH C_6 – C_{10}	700
TRH >C_{10}-C_{16}	1000
TRH >C_{16}-C_{34}	3500
TRH >C_{34}-C_{40}	10 000

7.1.4 Asbestos in Soil

Bonded asbestos-containing material (ACM) is the most common form of asbestos contamination across Australia, generally arising from:

- Inadequate removal and disposal practices during demolition of buildings containing asbestos products;
- Widespread dumping of asbestos products and asbestos containing fill on vacant land and development sites; and
- Commonly occurring in historical fill containing unsorted demolition materials.

Mining, manufacturing or distribution of asbestos products may result in sites being contaminated by friable asbestos including free fibres. Severe weathering or damage to bonded ACM may also result in the formation of friable asbestos comprising fibrous asbestos (FA) and/or asbestos fines (AF).

Asbestos only poses a risk to human health when asbestos fibres are made airborne and inhaled. If asbestos is bound in a matrix such as cement or resin, it is not readily made airborne except through substantial physical damage. Bonded ACM in sound condition represents a low human health risk, whilst both FA and AF materials have the potential to generate, or be associated with, free asbestos fibres. Consequently, FA and AF must be carefully managed to prevent the release of asbestos fibres into the air.

A detailed asbestos assessment was not undertaken as part of these works as it was unknown at the time of preparing the proposal if asbestos was a likely contaminant. As an initial screen, the site assessment criteria for asbestos are as follows:

- No visible asbestos-containing materials (ACM) at the sampling locations; and
- No asbestos detected at the laboratory reporting limit of 0.1 g/kg.

7.2 Groundwater

The groundwater investigation levels (GIL) used for interpretation of the groundwater results are based on the risks posed by contaminated groundwater, at or down-gradient of the site, as well as the potential uses of groundwater, as follows:

- Risk to aquatic ecosystems - based on general site topography and interpolated groundwater flow direction, groundwater that flows beneath the site is anticipated to discharge to Parramatta River. The 'marine water' guidelines have therefore been applied for the protection of aquatic ecosystems, consistent with the marine / brackish discharge point, of the Parramatta River;
- Potential potable use – it is considered unlikely that groundwater will be used for drinking. Therefore, drinking water criteria have not been considered;
- HSL for sand has been selected, as this scenario produces the most conservative HSLs. A depth range of 2 m to <4 m has been used as an initial conservative screen based on the proposed site design.

As of 29 August 2018, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) revoked the documents listed below, formerly used in deriving the NEPC (2013) groundwater investigation levels

- The Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, November 1992); and
- The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, October 2000).

Consequently, the groundwater site assessment criteria are based on the water quality default guideline values (DGV) from *the Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) for the protection of aquatic ecosystems.

The adopted SAC for groundwater for the adopted commercial/industrial land use are provided in Table E2, Appendix E.

8. Results

8.1 Fieldwork Results

8.1.1 Boreholes Observations

As noted in Section 2, the field work for the investigation comprised the drilling of seven boreholes (BH1 to BH7). The general sequence of subsurface materials encountered in the boreholes is described below. Details of the subsurface conditions encountered are given in the borehole logs in Appendix D, together with notes defining classification methods and descriptive terms:

PAVEMENT:	asphalt 30 – 50 mm thick over roadbase gravel to depths in the range 0.2 - 0.4 m;
FILLING:	sand and gravel filling to depths in the range 0.6 - 1.4 m;
CLAYEY SAND and IRONSTONE:	Clayey sand and ironstone gravel layers in BH2, BH3 and BH4 to depths in the range 0.8 – 1.25 m;
SANDSTONE:	Initially extremely low to very low strength, increasing to medium to high strength with depth. All three cored boreholes were terminated in high strength sandstone at depths in the range 6.0 - 12.0 m.

No free groundwater was observed during augering.

There were no visual or olfactory indicators (i.e. staining or odours) to suggest the presence of contamination within the boreholes.

8.1.2 Groundwater Sampling Observations

Groundwater levels were measured at the time of mirco-purging and sampling and the field measurements are summarised in Table 4 below (refer to field sheets presented in Appendix D).

Groundwater was measured in the monitoring wells in BH1 and BH5 at the time of the sampling event on 27 March 2019 at depths of 5.5 m (RL 17.0 m AHD) and 5.0 m (RL 12.7 m AHD), respectively. It should be noted that groundwater levels and flows will fluctuate with climatic conditions, particularly after periods of heavy rain.

Table 4: Groundwater Details and Water Levels

Bore/Well	Top of Casing/ surface level (R.L.)	Water level (m b.g.l.)	Water level (R.L.)	Temp (oC)	DO (mg/L)	EC (µS or mS/cm)	pH	Redox (Eh)
BH1	17.0	5.5	11.5	21.2	0.9	984	5.4	-8
BH5	12.7	5.0	7.7	N/A	N/A	N/A	N/A	N/A

8.2 Laboratory Results

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

- Table E1: Summary of Analytical Results – Soil;
- Table E2 : Summary Analytical Results – Groundwater; and
- Table E3: Summary of Analytical Results – Waste Classification.

The laboratory certificates together with the chain of custody and sample receipt advice are provided in Appendix F.

The Data Quality Assessment including the Quality Assurance and Quality Control findings is provided in Appendix C. The results of that assessment indicate that the laboratory and field data are reliable and suitable for the purpose of the investigation.

9. Discussion of Results

9.1 Soil

As shown in Table E1, Appendix E, reported concentrations of BTEX, OCP and OPP were below the laboratory practical quantitation limit (PQL) and therefore less than the adopted SAC. Detectable concentrations of metals, TRH, PAHs and PCBs were recorded in some soil samples, but below the SAC. The remaining analytes reported concentrations below the SAC.

Asbestos was not detected at the laboratory's limit of reporting of 0.1 g/kg.

9.2 Groundwater

Table E2, Appendix E provides a summary of the groundwater laboratory results as well as the adopted SAC and reference levels.

Reported concentrations of BTEX, phenols, OCP, OPP, PAHs, TRH and PCB were below the PQL and therefore the SAC.

Reported concentrations of dissolved metals in all groundwater samples were below the SAC for marine water, with the exception of copper, lead, nickel and zinc;

- Copper in sample BH01 (13 µg/L), which exceeded the DGV of 1.3 µg/L;
- Lead in sample BH01 (26 µg/L), which exceeded the DGV of 4.4 µg/L;
- Nickel in sample BH01 (13 µg/L), which exceeded the DGV of 7 µg/L; and
- Zinc in sample BH01 (100 µg/L), which exceeded the DGV of 15 µg/L

The results for copper, lead, nickel and zinc are considered to represent regional groundwater quality, common in urban environments, and are not considered to warrant remediation.

9.3 Preliminary Waste Classification

The preliminary waste classification was generally undertaken in accordance with the NSW EPA *Waste Classification Guidelines* 2014 (EPA, 2014).

Table 5: Six Step Procedure for Waste Classification

Step	Comments	Rationale
1. Is the waste special waste?	No	No asbestos containing materials (ACM), clinical or related waste, or waste tyres were observed in the boreholes. Asbestos was not detected by the analytical laboratory.
2. Is the waste liquid waste?	No	The fill comprised a soil matrix.
3. Is the waste "pre-classified"?	No	The filling material is not pre-classified with reference to EPA (2014).
4. Does the waste possess hazardous waste characteristics?	No	The waste was not observed to contain or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances, corrosive substances, coal tar, batteries, lead paint or dangerous goods containers.
5. Determining a wastes classification using chemical assessment	Conducted	Refer to Table E3, Appendix E.
6. Is the waste putrescible or non-putrescible?	No	The fill does not contain materials considered to be putrescible [1].

Note

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

As shown in Table E3, Appendix E, all contaminant concentrations for the analysed fill samples were within the contaminant thresholds (CT1s) for General Solid Waste (GSW) with the exception of nickel in samples BH2/0.1-0.2 and BH5/0.1-0.2, lead in samples BH1/0.9-1.0 and BH2/0.4-0.5 and Benzo(a)pyrene in sample BH2/0.4-0.5. TCLP tests were conducted for the analytes exceeding the CT1 thresholds.

The SCC and TCLP concentrations for those samples were within the contaminant thresholds SCC1 and TCLP1 for GSW.

On the basis of the observations at the time of sampling and the reported analytical results, the filling at the site is preliminarily classified as General Solid Waste (non-putrescible), as defined in EPA (2014).

Note that this is not a formal waste classification to inform off-site disposal. Any soils excavated from the site, requiring off-site disposal, must have a formal waste classification prior to disposal. This is likely to entail additional sampling and testing of soils.

10. Conclusion

On the basis of the scope of works undertaken and the results presented in this limited DSI, it is considered that there are not likely to be any significant contamination risks to human health or the ecology associated with the site. The site is suitable, from a contamination perspective, for the proposed development. Given the limited number of soil samples analysed, it is recommended that an unexpected finds protocol (UFP) be developed for implementation during the future civil, and construction works such that any finds of suspected contamination are approximately investigated and management.

Furthermore, it is recommended that additional soil sampling and testing be conducted once the site is more easily accessible (i.e. following the removal of the child care centre) to confirm the waste classification of soils prior to off-site disposal. As part of the waste classification process, the existing asphalt surfacing and underlying road base should be considered and assessed against appropriate Resource Recovery Exemptions (as issued by the NSW EPA), which may allow off-site reuse. Alternatively, the waste classification is to consider these materials separately.

All groundwater results were either within the SAC or within expected background conditions. The concentrations of potential contaminants in groundwater should be considered in determining treatment requirements for disposal of groundwater (e.g. if dewatering is required).

11. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at See Street, Meadowbank in accordance with DP's proposal SYD190020 dated 11 January 2019. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of TAFE NSW 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.

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.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawings

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.

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	NSW TAFE		
OFFICE:	Sydney	DRAWN BY:	CL
SCALE:	Not to Scale	DATE:	08.04.2019

TITLE: **Detailed Site Investigation Site Locality**
Proposed Multi-Trades & Digital Technology Hub
See Street, Meadowbank TAFE

N

PROJECT No:	86469.04
DRAWING No:	1
REVISION:	

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	NSW TAFE		
OFFICE:	Sydney	DRAWN BY:	CL
SCALE:	Not to Scale	DATE:	08.04.2019

TITLE: **Detailed Site Investigation Borehole Locations**
Proposed Multi-Trades & Digital Technology Hub
See Street, Meadowbank TAFE

N

PROJECT No:	86469.04
DRAWING No:	2
REVISION:	

Appendix B

Site Photographs

Photo 1 - The car park areas comprised ashpaltic concrete paved road surface

Photo 2 - The car park area , facing the North

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Detailed Site Investigation** **See Street, Meadowbank**	PROJECT: 86469.04 PLATE No: 1 REV: A
	CLIENT: TAFE NSW	DATE: 11-Apr-19

Photo 3 - The substation to the north east by an electricity substation

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs** **Detailed Site Investigation** **See Street, Meadowbank**	PROJECT: 86469.04 PLATE No: 2 REV: A
	CLIENT: TAFE NSW	DATE: 11-Apr-19

Appendix C

QA/QC

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The Preliminary Site Investigation (PSI) 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	S1 Introduction (objective) S10 Conclusions
Identify Inputs to the Decision	S1 Introduction S3 Site Identification, Description and Site Geology, Topography and Hydrogeology Mapping S4 Review of Previous Reports S5 Conceptual Site Model S7 Site Assessment Criteria S8 Fieldwork Results and Laboratory Results
Define the Boundary of the Assessment	S3 Site Identification, Description Drawing 1 - Appendix A Drawing 2 - Appendix A
Develop a Decision Rule	S7 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S6 Fieldwork, Analysis and QA/QC S7 Site Assessment Criteria QA/QC Procedures and Results – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S6 Fieldwork, Analysis and QA/QC QA/QC Procedures and Results – Sections Q2, Q3

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork and analysis procedures in Section 8 and the laboratory certificates in Appendix F for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	10% primary samples	RPD (<30% inorganics), <50% (organics)	yes[1]
Trip Spikes	1 per field batch	60-140% recovery	yes
Trip Blanks	1 per field batch	<PQL/LOR	yes

NOTES: 1 qualitative assessment of RPD results overall; refer Section Q2.1

Table Q3: Laboratory QC

Item	Frequency	Acceptance Criteria	Achievement
Analytical laboratories used		NATA accreditation	yes
Holding times		In accordance with NEPC (2013) which references various Australian and international standards	yes
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific [1]	
Matrix Spikes	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Surrogate Spikes	organics by GC	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes
Control Samples	1 per lab batch	70-130% recovery (inorganics); 60-140% (organics); 10-140% (SVOC, speciated phenols)	yes

NOTES: 1 ELS: <5xPQL – any RPD; >5xPQL – 0-50%RPD

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

Q2.1 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory Envirolab Services (ELS) and as a measure of consistency of sampling techniques. The comparative results of analysis between original and intra-laboratory replicate samples are summarised in Table Q4.

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics.

Overall, the intra-laboratory replicate comparisons indicate that the sampling techniques were generally consistent and repeatable.

Q2.2 Inter-Laboratory Replicates

Inter-laboratory replicates were conducted as a check of the reproducibility of results between the primary laboratory ELS and the secondary ALS and as a measure of consistency of sampling techniques.

The comparative results of analysis between original and inter-laboratory replicate samples are summarised in Table Q5.

Note that, where both samples are below LOR/PQL the difference and RPD has been given as zero. Where one sample is reported below LOR/PQL, but a concentration is reported for the other, the LOR/PQL value has been used for calculation of the RPD for the less than LOR/PQL sample.

Table Q4: Relative Percentage Difference Results – Intra-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals										PAH				TRH				BTEX			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Fe	Mn	total	BaP TEQ	BaP	Naphthalene	C6-C10	>C10-C16	>C16-C34	>C34-C40	Benzene	Ethylbenzene	Toluene	Xylene Total
SOIL																										
ELS	BH04/0.4-0.5	9/03/2019	filling	mg/kg	8	<0.4	26	10	20	<0.1	15	34	-	-	<0.05	-	<0.05	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<1
ELS	BD1/20190316	9/03/2019	filling	mg/kg	<4	<0.4	15	11	23	<0.1	15	38	-	-	<0.05	-	<0.05	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<1
Difference				mg/kg	4.0	0.0	11.0	1.0	3.0	0.0	0.0	4.0	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD				%	66.7	0.0	53.7	9.5	14.0	0.0	0.0	11.1	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: - not applicable, not tested

Table Q5: Relative Percentage Difference Results – Inter-laboratory Replicates

Lab	Sample ID	Date Sampled	Media	Units	Metals										PAH				TRH				BTEX			
					As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Fe	Mn	total	BaP TEQ	BaP	Naphthalene	C6-C10	>C10-C16	>C16-C34	>C34-C40	Benzene	Ethylbenzene	Toluene	Xylene Total
SOIL																										
ELS	BH05/0.1-0.2	9/03/2019	filling	mg/kg	8	68	3	<0.1	100	39	8	68	-	-	<0.05	-	<0.05	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<1
ALS	BD1/20190317	9/03/2019	filling	mg/kg	<5	<1	6	60	<5	-	143	46	-	-	<0.05	-	<0.05	<50	<25	<50	<100	<100	<0.2	<1	<0.5	<1
Difference				mg/kg	1.0	0.6	2.0	8.0	2.0	-	43.0	7.0	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD				%	22.2	85.7	28.6	12.5	50.0	-	35.4	16.5	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: - not applicable, not tested

Q2.3 Review of Laboratory Comments

The laboratory certificates all included the QA/QC testing and results undertaken.

Comments provided in the laboratory certificates, including any exceedances of their QA/QC, are discussed in Table Q6, below. Overall it is considered that the acceptable standards were achieved for the laboratory analysis and that the results are acceptable for use in this assessment.

Table Q6: Laboratory Comments

Lab Report ID	Lab Comment	DP Comment
ELS 213673	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 was sub-sampled from jars provided by the client.	Where no potential ACM was observed in the field, there is considered to be no practical difference between sub-sampling in the field or in the laboratory.
	PAH in soil – The laboratory RPD for duplicate results is accepted due to the non-homogenous nature of sample 1.	This is not considered to impact the usability of the data

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 Q7.

Table Q7: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic and selected target locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) 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 COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC 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; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all 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 D

Descriptive Notes

Borehole Logs

Groundwater Field Sheets

Sampling Methods

Douglas Partners

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.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. 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	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

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

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

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	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

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;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and 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 test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

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

* 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
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

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 some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

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

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

where 'sound' rock is assessed to be rock of low strength or better. 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

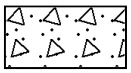
Symbols & Abbreviations

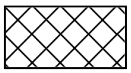
Graphic Symbols for Soil and Rock

General

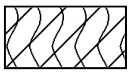

Asphalt

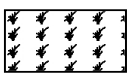

Road base

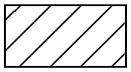

Concrete

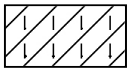

Filling

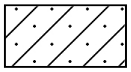
Soils


Topsoil

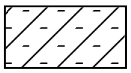

Peat

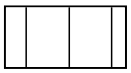

Clay

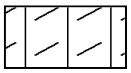

Silty clay

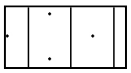

Sandy clay

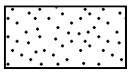

Gravelly clay

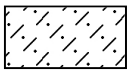

Shaly clay

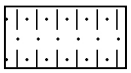

Silt


Clayey silt


Sandy silt

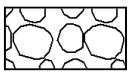

Sand

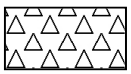

Clayey sand


Silty sand


Gravel

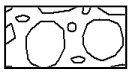

Sandy gravel


Cobbles, boulders

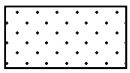

Talus

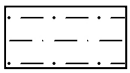
Sedimentary Rocks

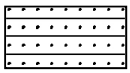

Boulder conglomerate

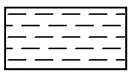

Conglomerate


Conglomeratic sandstone

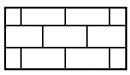

Sandstone


Siltstone

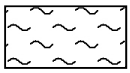

Laminite

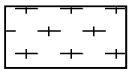

Mudstone, claystone, shale

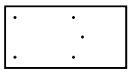

Coal


Limestone

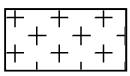
Metamorphic Rocks

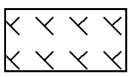

Slate, phyllite, schist

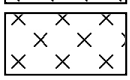

Gneiss

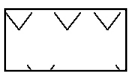

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 22.5 AHD
EASTING: 323562.1
NORTHING: 6256839
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 86469.04
DATE: 15/3/2019
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
22.5	0.05	ASPHALTIC CONCRETE: 50mm thick		A	0.1		PID=3 ppm		Gatic Cover
	0.25	ROADBASE: brown sandy gravel		A	0.2				
		FILLING: brown sand filling with fine to medium igneous gravel, trace of tile and charcoal		A	0.4		PID=2 ppm		
				S	0.5		8,7,10 N = 17		Bentonite
	0.85	FILLING: red-brown clayey sand filling with fine to medium igneous gravel		A	0.9		PID=1 ppm		
21.5	1.1	SANDSTONE: extremely low to very low strength, extremely to highly weathered, yellow brown sandstone		A	0.95		PID=2.8 ppm		
				S	1.0		3,7,11 N = 18		
					1.45		PID=1.5 ppm		
				A	1.5		PID=2.5 ppm		
					1.6				
	1.87			C	1.77				
20.5		SANDSTONE: extremely low strength then high strength, moderately then slightly weathered, fractured, red-brown, orange and grey, medium to coarse grained sandstone with some extremely low strength bands			1.87		PL(A) = 0.57		
					1.96				
					2.95		PL(A) = 0.73		
19.5					3.52				
	3.8				3.95		PL(A) = 0.55		
18.5	4.3	SANDSTONE: high strength, fresh and slightly weathered, fractured and slightly fractured, orange and pale-grey, medium to coarse grained sandstone with some indistinct siltstone laminations		C	4.95		PL(A) = 1.71		
					5.95		PL(A) = 1.4	20-03-19	
					6.54				Gravel
16.5					6.95		PL(A) = 1.52		Machine slotted PVC screen
				C	7.95		PL(A) = 1.47		
14.5					8.95		PL(A) = 1.76		
13.5				C	9.56				
					9.95		PL(A) = 2.25		

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL/SB **CASING:** HW to 1.9m

TYPE OF BORING: Standard penetration test to 1.45m; Solid Flight Auger to 1.9m; HQ coring to 12m.

WATER OBSERVATIONS: No free groundwater observed during drilling. Groundwater measured at 5.5m on 20/3/2019

REMARKS: Location coordinates are in MGA94 Zone 56. Monitoring well installed to 12m depth; from 2.8m: 25% water loss; coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 22.5 AHD
EASTING: 323562.1
NORTHING: 6256839
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 86469.04
DATE: 15/3/2019
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
11	11	SANDSTONE: high strength, fresh and slightly weathered, fractured and slightly fractured, orange and pale-grey, medium to coarse grained sandstone with some indistinct siltstone laminations *(continued)*		C	10.95		PL(A) = 2		
12	12 12.0	Bore discontinued at 12.0m - Target depth			12.0				End cap
10	13								
9	14								
8	15								
7	16								
6	17								
5	18								
4	19								
3									

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL/SB **CASING:** HW to 1.9m

TYPE OF BORING: Standard penetration test to 1.45m; Solid Flight Auger to 1.9m; HQ coring to 12m.

WATER OBSERVATIONS: No free groundwater observed during drilling. Groundwater measured at 5.5m on 20/3/2019

REMARKS: Location coordinates are in MGA94 Zone 56. Monitoring well installed to 12m depth; from 2.8m: 25% water loss; coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 20.2 AHD
EASTING: 323538.2
NORTHING: 6256859
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 86469.04
DATE: 15/3/2019
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
20	0.05	ASPHALTIC CONCRETE: 50mm thick							
	0.2	ROADBASE: sandy gravel		A	0.1–0.2				
		FILLING: brown clayey sand filling with fine to medium igneous gravel, trace of medium to coarse sandstone gravel		A	0.4–0.5		PID<1 ppm		
	0.6								
	0.8	IRONSTONE: red ironstone layer		A	0.9–1.0		PID=1.6 ppm		
19	1	SANDSTONE: extremely low to very low strength, extremely to highly weathered, orange brown sandstone							1
	1.5	Bore discontinued at 1.5m - Target depth							
18	2								2
17	3								3
16	4								4
15	5								5
14	6								6
13	7								7
12	8								8
11	9								9

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL **CASING:** Uncased

TYPE OF BORING: Hand tools to 1.1m; Solid Flight Auger to 1.5m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. Coordinates and GSL from DGPS.

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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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 18.8 AHD
EASTING: 323515.9
NORTHING: 6256880
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 86469.04
DATE: 15/3/2019
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
18.8	0.05	ASPHALTIC CONCRETE: 50mm thick		A	0.1		PID<1 ppm		
					0.2				
18.4	0.4	ROADBASE: sandy gravel		A	0.4		PID=1.3 ppm		
		FILLING: brown clayey sand filling with fine to medium igneous gravel			0.5				
18.1	0.7	CLAYEY SAND: orange, red-brown clayey sand, trace of ironstone gravel		A	0.9		PID<1 ppm		
	1				1.0				1
17.7	1.1	IRONSTONE: red ironstone							
17.55	1.25	SANDSTONE: extremely low to very low strength, extremely to highly weathered, yellow sandstone		A	1.4		PID=0.3 ppm		
17.3	1.5	Bore discontinued at 1.5m - Target depth			1.5				
	2								2
	3								3
	4								4
	5								5
	6								6
	7								7
	8								8
	9								9

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL **CASING:** Uncased

TYPE OF BORING: Hand tools to 1.1m; Solid Flight Auger to 1.5m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. Coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 20.7 AHD
EASTING: 323505.5
NORTHING: 6256825
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 86469.04
DATE: 16/3/2019
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
20.7	0.03	ASPHALTIC CONCRETE: 30mm thick		A	0.1		PID=6 ppm		
20.6	0.2	ROADBASE: dark brown sandy gravel			0.2				
		FILLING: brown sand filling with fine to medium igneous gravel, trace of sandstone gravel		A	0.4		PID<1 ppm		
20.1	0.6				0.5				
20.0	0.8	IRONSTONE: red, ironstone		A	0.9				
19.9	1.0				1.0				
19.7	1.2	SANDSTONE: extremely low to very lwo strength, extremely to highly weathered, yellow brown sandstone							
		Bore discontinued at 1.2m - Target depth							

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL **CASING:** Uncased

TYPE OF BORING: Solid Flight Auger to 1.2m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. BD1/20190316 taken from 0.4-0.5m; coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 17.7 AHD
EASTING: 323486
NORTHING: 6256842
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 86469.04
DATE: 17/3/2019
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
17	0.03	ASPHALTIC CONCRETE: 30mm thick		BD1-1, BD1-2	0.2				Gatic Cover
	0.35	ROADBASE: dark grey-brown sandy gravel. Fine to medium igneous gravel			0.4				
		FILLING: orange-brown crushed sandstone filling		S			18,20,19 N = 39		Bentonite
1		0.8m: becoming slightly clayey with trace of fine to medium igneous gravel			0.95				
				S	1.0		7,7,11/80 refusal		
	1.4				1.38		PL(A) = 1.06		
16		SANDSTONE: high strength, moderately to slightly weathered, slightly fractured to unbroken, pale grey and brown, fine to medium grained sandstone with some high strength ironstained bands			1.4				
2					1.95		PL(A) = 1.61		
15				C					
3		3.05m: becomes fresh stained			2.9		PL(A) = 0.96		Gravel
14									Machine slotted PVC screen
					3.7		PL(A) = 1.64		
4					4.15				
13					4.8		PL(A) = 1.15		
5				C				20-03-19	
					5.15		PL(A) = 1.26		
	5.26	SANDSTONE: high strength, fresh, slightly fractured, grey, fine to medium grained sandstone with some carbonaceous laminations							
12									End cap
6	6.0	Bore discontinued at 6.0m - Target depth			6.0				
11									
7									
10									
8									
9									
8									

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL/JB **CASING:** HW to 1.4m

TYPE OF BORING: Standard penetration test to 1.3m; Solid Flight Auger to 1.4m; NMLC coring to 6m.

WATER OBSERVATIONS: No free groundwater observed during drilling. Groundwater measured at 5.0m on 20/3/2019

REMARKS: Location coordinates are in MGA94 Zone 56. BD1-1/BD1-2 taken from 0.2m; Monitoring well installed to 5.85m depth; coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 23.6 AHD
EASTING: 323520.5
NORTHING: 6256790
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 86469.04
DATE: 16/3/2019
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
23	0.03	ASPHALTIC CONCRETE: 30mm thick		A	0.0				
				A	0.1		PID < 1 ppm		
	0.35	ROADBASE: sandy gravel		A	0.2				
		SANDSTONE: extremely low to very low strength, extremely to highly weathered, yellow sandstone		A	0.4		PID < 1 ppm		
				A	0.5		18,25/100 refusal		
				S	0.75		PID < 1 ppm		
1	1.0			A	0.9		PID < 1 ppm		
					1.0				
22	1.53	SANDSTONE: extremely to very low strength then very low strength, extremely weathered to high weathered, fragmented and fractured, orange red-brown with pale grey, medium to coarse sandstone with some very low and extremely low strength bands		C	1.63		PL(A) = 2.37		
2		SANDSTONE: high strength, moderately weathered, fractured and slightly fractured, orange red-brown and pale grey, medium to coarse sandstone with some extremely low strength bands and indistinct siltstone laminations							
21	2.51				2.51		PL(A) = 1.42		
3				C					
20					3.44		PL(A) = 1.6		
4					3.95				
19					4.54		PL(A) = 2.36		
5									
18				C	5.55		PL(A) = 1.53		
6					6.24		PL(A) = 2.1		
17									
7					6.95				
16					7.35		PL(A) = 2.53		
8	7.92	SANDSTONE: high strength, fresh stained then fresh, slightly fractured, pale grey, medium to coarse grained sandstone							
15		7.92-9.24m: indistinct siltstone laminations		C	8.55		PL(A) = 4.38		
9									
14		9.24-11.00m: massive sandstone			9.54		PL(A) = 1.1		

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL/SB **CASING:** Uncased

TYPE OF BORING: Standard penetration test to 0.95m; Solid Flight Auger to 1.0m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. Coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 23.6 AHD
EASTING: 323520.5
NORTHING: 6256790
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 86469.04
DATE: 16/3/2019
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
13	11	SANDSTONE: high strength, fresh stained then fresh, slightly fractured, pale grey, medium to coarse grained sandstone *(continued)*			10.06				
					10.51		PL(A) = 1.49		
		11.00m: with some siltstone clasts and inclusions in form of breccia		C					
12					11.53		PL(A) = 0.34		
	12.0	Bore discontinued at 12.0m - Target depth			12.0				

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL/SB **CASING:** Uncased

TYPE OF BORING: Standard penetration test to 0.95m; Solid Flight Auger to 1.0m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. Coordinates and GSL from DGPS.

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: The Technical & Further Education Commission
PROJECT: Multi-Trades and Digital Technology Hub
LOCATION: See Street, Meadowbank TAFE

SURFACE LEVEL: 17.2 AHD
EASTING: 323468.3
NORTHING: 6256807
DIP/AZIMUTH: 90°/--

BORE No: BH7
PROJECT No: 86469.04
DATE: 16/3/2019
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
17	0.03	ASPHALTIC CONCRETE		A*	0.1-0.2		PID <1 ppm		
	0.3	ROADBASE: brown gravelly sand roadbase. Fine to medium igneous gravel, trace of fine to medium sandstone gravel		A	0.4-0.5		PID <1 ppm		
	0.5	FILLING: red-brown sand filling with fine to medium igneous gravel		A	0.9-1.0		PID <1 ppm		
16	1.0	FILLING: light brown sand filling with trace of fine to medium igneous gravel and ironstone gravel		A	1.4-1.5		PID <1 ppm		
	1.5	SANDSTONE: extremely low to very low strength, extremely to highly weathered, yellow brown sandstone							
15		Bore discontinued at 1.5m - Target depth							
14									
13									
12									
11									
10									
9									
8									

RIG: Bobcat **DRILLER:** GM **LOGGED:** CL **CASING:** Uncased

TYPE OF BORING: Solid Flight Auger to 1.5m.

WATER OBSERVATIONS: No free groundwater observed during drilling

REMARKS: Location coordinates are in MGA94 Zone 56. BD2/20190316 taken from 0.1-0.2m; coordinates and GSL from DGPS.

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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Groundwater Field Sheet

Project and Bore Installation Details			
Bore / Standpipe ID:	BH01		
Project Name:	Tafe NSW		
Project Number:	86469.04		
Site Location:	See Sheet, Meadowbank		
Bore Easting:		Northing:	
Installation Date:			
GW Level (during drilling):	m bgl		
Well Depth:	m bgl		
Screened Interval:	m bgl		
Contaminants/Comments:			
Bore Development Details			
Date/Time:	20/3/19 8:30 am		
Purged By:	CL		
GW Level (pre-purge):	5.35 m bgl		
GW Level (post-purge):	6.0 m bgl		
PSH observed:	Yes / (No) (interface/visual). ? mm thick		
Observed Well Depth:	12 m bgl		
Estimated Bore Volume:	43.9 L		
Total Volume Purged:	18 L		
Equipment:	tunser pump, bailer, interface meter		
Micropurge and Sampling Details			
Date/Time:	27/3/19 7:00 am.		
Sampled By:	CL		
Weather Conditions:	Sunny		
GW Level (pre-purge):	5.5 m bgl		
GW Level (post sample):	7.32 m bgl		
PSH observed:	Yes / (No) (interface/visual). ? mm thick		
Observed Well Depth:	12.0 m bgl		
Estimated Bore Volume:	43.7 L		
Total Volume Purged:	13 L		
Equipment:	Peri pump, Interface meter		

Water Quality Parameters

Time / Volume	Temp (°C)	DO (~~mg/L~~ %)	EC (µS or mS/cm)	pH	Redox (mV)
Stabilisation Criteria (3 readings)	***0.1° C***	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10 mV**
7:31 am.	21.3	1.16	969	5.69	11
7:32.	21.3	0.99	978	5.59	6
7:33.	21.2	0.95	984	5.37	−2
7:34	21.2	0.93	984	5.35	−6
7:35	21.2	0.95	984	5.35	−8
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS		

Sample Details

Sampling Depth (rationale):	7.0 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	No odour. Clear water
Sample ID:	BH01
QA/QC Samples:	BD1/20190327
Sampling Containers and filtration:	Amber ×2. Vols×3. Phenols×1. HM×1
Comments / Observations:	N/A

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Groundwater Field Sheet

Project and Bore Installation Details			
Bore / Standpipe ID:	BH05		
Project Name:	TAFE NSW		
Project Number:	86669.04		
Site Location:	See Sheet, Meadowbank		
Bore Easting:		Northing:	
Installation Date:			
GW Level (during drilling):	m bgl		
Well Depth:	m bgl		
Screened Interval:	m bgl		
Contaminants/Comments:			
Bore Development Details			
Date/Time:	20/3/19	8:10 am	
Purged By:	CL		
GW Level (pre-purge):	5.0 m bgl		
GW Level (post-purge):	5.4 m bgl		
PSH observed:	Yes / (No) (interface/visual). ? mm thick		
Observed Well Depth:	5.49 m bgl		
Estimated Bore Volume:	3.5 L		
Total Volume Purged:	3.5L till dry		
Equipment:	bailer, interface meter		
Micropurge and Sampling Details			
Date/Time:	27/3/19		
Sampled By:	CL		
Weather Conditions:	Sunny		
GW Level (pre-purge):	5.3 m bgl		
GW Level (post sample):	m bgl		
PSH observed:	Yes / No (interface/visual). ? mm thick		
Observed Well Depth:	5.49 m bgl		
Estimated Bore Volume:	L		
Total Volume Purged:	0 L		
Equipment:			

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Redox (mV)
Stabilisation Criteria (3 readings)	***0.1° C***	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10 mV**
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS		

Sample Details

Sampling Depth (rationale):	m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	
Sample ID:	
QA/QC Samples:	
Sampling Containers and filtration:	
Comments / Observations:	dry well

Appendix E

Summary of Results Tables

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Table 1: Summary of Laboratory Results – OCP, OPP, PCB

		OCP								OPP	PCB
		DDT+DDE+DDD	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyriphos	Total PCB
	PQL	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Sample ID	Sampled Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH01/0.4-0.5	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH01/0.9-1.0	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BH02/0.1-0.2	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BH02/0.4-0.5	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH03/0.1-0.2	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BH03/0.4-0.5	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH04/0.1-0.2	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH04/0.4-0.5	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BH05/0.1-0.2	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH05/0.4-0.5	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BH06/0.1-0.2	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	**0.2** 7 NC
BH07/0.1-0.2	01/01/0001	<0.1 3600 NC	<0.1 45 NC	<0.1 530 NC	<0.1 2000 NC	<0.1 100 NC	<0.1 50 NC	<0.1 80 NC	<0.1 2500 NC	<0.1 2000 NC	<0.1 7 NC
BH07/0.4-0.5	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC
BD1/20190316	01/01/0001	NT 3600 NC	NT 45 NC	NT 530 NC	NT 2000 NC	NT 100 NC	NT 50 NC	NT 80 NC	NT 2500 NC	NT 2000 NC	NT 7 NC

HIL / HSL EIL / ESL exceedance ML exceedance HIL/HSL and EIL/ESL exceedance **Bold** = Lab detections

ML and HIL/HSL/EIL/ESL **red** = DC exceedance NT = Not tested NL = Non limiting NC = No criteria NAD = No asbestos detected

Key: Lab result (HIL/HSL value | EIL/ESL value)

Indicates that asbestos has been detected by the lab below the PQL, refer to the lab report

Notes:

a

HIL/HSL

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Table E2 - Summary of Analytical Results - Groundwater (All results in µg/L unless otherwise stated)

Monitoring Well ID	Date Sampled	Metals: Arsenic (Filtered)	Metals: Cadmium (Filtered)	Metals: Chromium (III+VI) (Filtered)	Metals: Copper (Filtered)	Metals: Lead (Filtered)	Metals: Mercury (Filtered)	Metals: Nickel (Filtered)	Metals: Zinc (Filtered)	TRH: C6-C10 less BTEX (F1)	TRH: F2-NAPHTHALENE	TRH: Total TRH >C10-C40	BTEX: Benzene	BTEX: Toluene	BTEX: Ethylbenzene	BTEX: Xylene (m&p)	BTEX: Xylene (o)
PQL		1	0.1	1	1	1	0.05	1	1	10	50	PQL	1	1	1	2	1
Site Assessment Criteria (SAC)																	
HSL D, 2m<4m , Sand		-	-	-	-	-	-	-	-	6000	NL	-	5000	NL	NL	NL	NL
DGV[2] for slightly to moderately disturbed marine waters		13[a]	0.7[b]	27.4 (Cr III) 4.4 (Cr VI)	1.3	4.4	0.1[b]	7[b]	15	-	-	-	500[b]	180[c]	5[c]	75[c] (m xylene) 200[c] (p xylene)	350[c]
Inerim marine water guideline [3], 95% species protection		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	27/03/2019	<1	0.1	2	13	26	<0.05	13	100	<10	<50	<PQL	<1	<1	<1	<2	<1

Monitoring Well ID	Date Sampled	OCP: Alpha+gamma chlordane	OCP: DDE	OCP: DDT	OCP: Endosulfan (I+II)	OCP: Endrin	OCP: Heptachlor	OCP: Aldrin	OCP: Dieldrin	OCP: Methoxychlor	OCP: Mirex	OCP: Heprachlor+heptachlor epoxide	OPP: Azinphos-methyl	OPP: Bromophos-ethyl	OPP: Chlorpyifos	OPP: Diazinon	OPP: Dichlorovos	OPP: Dimethoate	OPP: Ethion	OPP: Fenitrothion	OPP: Malathion	OPP: Parathion	OPP: Mrthyl Parathion	PAH: Benzo(a) pyrene	PAH: Naphthalene	PAH: Total PAH	Phenols: Phenol (mg/L)	PCB: Aroclor 1242	PCB: Aroclor 1254
PQL		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1	1	1	0.05	2	2
Site Assessment Criteria (SAC)																													
HSL D, 2m<4m , Sand		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NL	-	-	-	-
DGV[2] for slightly to moderately disturbed marine waters		0.002	0.0005	0.0004	0.005	0.004	0.0004	0.003	0.01	0.004	0.04	-	0.01	-	0.09	0.01	-	0.15	-	0.001	0.05	0.004	-	0.1[c]	50[b]	-	0.4	0.3[c]	0.01[c]
Inerim marine water guideline [3], 95% species protection		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH01	27/03/2019	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<1	<PQL	<0.05	<2	<2

Notes

2 Groundwater Default Guideline Values obtained from (ANZG 2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality
3 Table 5 HEPA (2018) PFAS NEPM (2018)
a Freshwater DGV applied
b Based on 99 % level of species protection
c Unknown level of protection
BOLD Values over the PQL
PQL Practical Quantitation Limit

Table E3: Summary of Analytical Results - Waste Classification

	Metals										Phenols	Asbestos	OCPs																					
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Lead in TCCLP	Mercury	Nickel	Nickel in TCLP	Zinc	Phenolics Total	Asbestos	4,4-DDE	a-BHC	Aldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	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/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
PQL	4	0.4	1	1	1	0.03	0.1	1	0.02	1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)	100	20	100	-	100		4	40		-	288	-																						
NSW EPA 2014 General Solid Waste SCC1	500	100	1900	-	1500	5	50	1050	2	-	518	-																						
NSW EPA 2014 Restricted Solid Waste (CT2)	400	80	400	-	400		16	160		-	1152	-																						
NSW EPA 2014 Restricted Solid Waste SCC2	2000	400	7600	-	6000	20	200	4200	8	-	2073	-																						
Field	**Sample Date**	**Matrix**																																
BH01/0.4-0.5	19/03/2019	Filling	<4	<0.4	18	14	36		0.1	20		63	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH01/0.4-0.5	19/03/2019	Filling	<4	<0.4	19	13	30		0.1	18		53	-	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH01/0.9-1.0	19/03/2019	Filling	6	<0.4	39	37	120	<0.03	0.1	36		200	-	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02/0.1-0.2	19/03/2019	Filling	<4	<0.4	7	64	2		<0.1	100	0.2	38	-	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH02/0.4-0.5	19/03/2019	Filling	5	<0.4	44	43	120	<0.03	0.8	50		280	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH03/0.1-0.2	19/03/2019	Filling	<4	<0.4	8	49	3		<0.1	95		36	<5	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH03/0.4-0.5	19/03/2019	Filling	4	<0.4	16	3	10		<0.1	6		9	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04/0.1-0.2	19/03/2019	Filling	<4	<0.4	13	31	10		<0.1	50		32	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04/0.4-0.5	19/03/2019	Filling	8	<0.4	26	10	20		<0.1	15		34	<5	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05/0.1-0.2	19/03/2019	Filling	<4	<0.4	8	68	3		<0.1	100	0.2	39	-	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH05/0.4-0.5	19/03/2019	Filling	<4	<0.4	10	34	61		0.2	14		190	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH06/0.1-0.2	19/03/2019	Filling	5	<0.4	16	22	77		0.2	10		250	-	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH07/0.1-0.2	19/03/2019	Filling	<4	<0.4	11	17	21		<0.1	29		43	-	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH07/0.4-0.5	19/03/2019	Filling	<4	<0.4	17	24	35		0.3	11		67	<5	NAD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BD1/20190316	19/03/2019	Filling	<4	<0.4	15	11	23		<0.1	15		38	<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	<0.1	<0.1	<0.1	<0.1	<0.1

Notes

NAD- No asbestos detected

BD1/20190316 Taken at BH04/0.4-0.5

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Table E3: Summary of Analytical Results - Waste

			OPPs												PAHs																PCBs							
			Azinophos methyl	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(a) pyrene in TCLP	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total PAH	Arochlor 1016	Arochlor 1221	Arochlor 1232	Arochlor 1242	Arochlor 1248	Arochlor 1254	Arochlor 1260
			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/L	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
PQL			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NSW EPA 2014 General Solid Waste (CT1)					4														0.8											200							
NSW EPA 2014 General Solid Waste SCC1					7.5														10											200							
NSW EPA 2014 Restricted Solid Waste (CT2)					16														3.2											800							
NSW EPA 2014 Restricted Solid Waste SCC2					30														23											800							
Field	**Sample Date**	**Matrix**																																				
BH01/0.4-0.5	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	**0.3**		**0.2**	**0.4**	<0.1	**0.6**	<0.1	**0.2**	<0.1	**0.3**	**0.6**	**3.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH01/0.4-0.5	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.5	**0.4**		**0.2**	**0.6**	<0.1	**1**	<0.1	**0.2**	<0.1	**0.6**	**1**	**5.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH01/0.9-1.0	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	0.4	**0.4**		**0.3**	**0.4**	<0.1	**0.6**	<0.1	**0.2**	<0.1	**0.2**	**0.7**	**3.8**	-	-	-	-	-	-	-
BH02/0.1-0.2	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	-	-	-	-	-	-
BH02/0.4-0.5	19/03/2019	Filling	<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	**0.3**	**0.5**	2.2	2.5	<0.001	**1.5**	**2.6**	**0.3**	**4.5**	0.1	**1.3**	**0.4**	**2.3**	**4.5**	**27**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH03/0.1-0.2	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	-	-	-	-	-	-
BH03/0.4-0.5	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04/0.1-0.2	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH04/0.4-0.5	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	-	-	-	-	-	-
BH05/0.1-0.2	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	-	-	-	-	-	-
BH05/0.4-0.5	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	**0.1**		<0.1	**0.2**	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.98**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BH06/0.1-0.2	19/03/2019	Filling	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	0.1	**0.1**		<0.1	**0.2**	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.99**	-	-	-	-	-	-	-
BH07/0.1-0.2	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1
BH07/0.4-0.5	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
BD1/20190316	19/03/2019	Filling	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Notes

NAD- No asbestos detected

BD1/20190316 Taken at BH04/0.4-0.5

Table E3: Summary of Analytical Results - Waste

		TRHs																BTEX										
	PCBs (Sum of total)	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C10 - C14	C15 - C28	C29-C36	C10 - C40 (Sum of total)	Toluene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichlorofluoromethane	Vinyl chloride	Xylene (m & p)	Xylene (o)	Benzene	Ethylbenzene	Naphthalene	Toluene	C6 - C9	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	C6-C10
	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
PQL	0.1	50	100	100	50	50	100	100	50	0.5	1	1	1	1	2	1	0.2	1	1	0.5	25	2	1	1	25	25
NSW EPA 2014 General Solid Waste (CT1)	50									288				4			10	600		288	650			1000		
NSW EPA 2014 General Solid Waste SCC1	50									518				7.2			18	1080		518	650			1800		
NSW EPA 2014 Restricted Solid Waste (CT2)	50									1152				16			40	2400		1152	2600			4000		
NSW EPA 2014 Restricted Solid Waste SCC2	50									1152				16			72	4320		2073	2600			7200		
Field	**Sample Date**	**Matrix**																										
BH01/0.4-0.5	19/03/2019	Filling	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH01/0.4-0.5	19/03/2019	Filling	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH01/0.9-1.0	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH02/0.1-0.2	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH02/0.4-0.5	19/03/2019	Filling	<0.1	<50	**200**	100	<50	<50	<100	**140**	**300**	<0.5	**-**	-	**-**	-	**-**	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH03/0.1-0.2	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	<1	<1	<1	<1	<1	<1	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH03/0.4-0.5	19/03/2019	Filling	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH04/0.1-0.2	19/03/2019	Filling	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH04/0.4-0.5	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	<1	<1	<1	<1	<1	<1	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH05/0.1-0.2	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH05/0.4-0.5	19/03/2019	Filling	<0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH06/0.1-0.2	19/03/2019	Filling	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH07/0.1-0.2	19/03/2019	Filling	**0.2**	<50	<100	<100	<50	<50	<100	<100	<50	<0.5	-	-	-	-	-	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BH07/0.4-0.5	19/03/2019	Filling	0.1	<50	<100	**110**	<50	<50	<100	<100	**110**	<0.5	**-**	-	**-**	-	**-**	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25
BD1/20190316	19/03/2019	Filling	<0.1	<50	<100	**<100**	<50	<50	<100	<100	**<50**	<0.5	**-**	-	**-**	-	**-**	-	<0.2	<1	<1	<0.5	<25	<2	<1	<1	<25	<25

Notes

NAD- No asbestos detected

BD1/20190316 Taken at BH04/0.4-0.5

Appendix F

Laboratory Analysis Certificates

Chain of Custody Documentation

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 213673

Client Details

Client	Douglas Partners Pty Ltd
Attention	Paul Gorman
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**86469.04, Meadowbank**
Number of Samples	16 Soil
Date samples received	18/03/2019
Date completed instructions received	18/03/2019

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	25/03/2019
Date of Issue	25/03/2019

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Authorised by Asbestos Approved Signatory: Matt Tang

Results Approved By
Giovanni Agosti, Group Technical Manager
Jeremy Faircloth, Operations Manager, Sydney
Ken Nguyen, Reporting Supervisor
Matthew Tang, Asbsestos Supervisor
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Organics Supervisor

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference	UNITS	BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019	21/03/2019
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	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	113	110	113	111	111

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019	21/03/2019
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	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	108	110	108	107	108

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		213673-11	213673-12	213673-13	213673-14	213673-15
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5	BD1/20190316	Trip Spike
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019	21/03/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	98%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	98%
Ethylbenzene	mg/kg	<1	<1	<1	<1	99%
m+p-xylene	mg/kg	<2	<2	<2	<2	99%
o-Xylene	mg/kg	<1	<1	<1	<1	99%
naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	111	108	110	109	101

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		213673-16
Your Reference	UNITS	Trip Blank
Type of sample		Soil
Date extracted	-	19/03/2019
Date analysed	-	21/03/2019
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	<1
Surrogate aaa-Trifluorotoluene	%	114

svTRH (C10-C40) in Soil						
Our Reference		213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference	UNITS	BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	140	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	200	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	300	<50
Surrogate o-Terphenyl	%	95	93	95	95	96

svTRH (C10-C40) in Soil						
Our Reference		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	93	94	94	92	95

svTRH (C10-C40) in Soil					
Our Reference		213673-11	213673-12	213673-13	213673-14
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5	BD1/20190316
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	110	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	110	<50
Surrogate o-Terphenyl	%	93	95	101	92

PAHs in Soil						
Our Reference		213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference	UNITS	BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Phenanthrene	mg/kg	0.3	0.2	<0.1	2.3	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.5	<0.1
Fluoranthene	mg/kg	0.6	0.6	<0.1	4.5	<0.1
Pyrene	mg/kg	0.6	0.7	<0.1	4.5	<0.1
Benzo(a)anthracene	mg/kg	0.3	0.4	<0.1	2.2	<0.1
Chrysene	mg/kg	0.4	0.4	<0.1	2.6	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.5	0.7	<0.2	4.1	<0.2
Benzo(a)pyrene	mg/kg	0.3	0.4	<0.05	2.5	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	0.2	<0.1	1.3	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	0.3	<0.1
Benzo(g,h,i)perylene	mg/kg	0.2	0.3	<0.1	1.5	<0.1
Total +ve PAH's	mg/kg	3.3	3.8	<0.05	27	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	3.6	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.5	<0.5	3.6	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	0.6	<0.5	3.6	<0.5
Surrogate p-Terphenyl-d14	%	102	107	104	106	112

PAHs in Soil						
Our Reference		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	1.0
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.5
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	4.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.5
Surrogate p-Terphenyl-d14	%	107	103	109	104	106

PAHs in Soil					
Our Reference		213673-11	213673-12	213673-13	213673-14
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5	BD1/20190316
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.2	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.98	<0.05	0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	106	106	113	100

Organochlorine Pesticides in soil						
Our Reference	UNITS	213673-1	213673-4	213673-6	213673-7	213673-9
Your Reference		BH01/0.4-0.5	BH02/0.4-0.5	BH03/0.4-0.5	BH04/0.1-0.2	BH05/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-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
beta-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
pp-DDD	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-DDT	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
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	%	88	88	105	84	104

Organochlorine Pesticides in soil			
Our Reference		213673-11	213673-12
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2
Type of sample		Soil	Soil
Date extracted	-	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-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
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	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	%	87	86

Organophosphorus Pesticides						
Our Reference		213673-1	213673-4	213673-6	213673-7	213673-9
Your Reference	UNITS	BH01/0.4-0.5	BH02/0.4-0.5	BH03/0.4-0.5	BH04/0.1-0.2	BH05/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Azinphos-methyl (Guthion)	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
Chlorpyriphos	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
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
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
Ethion	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
Parathion	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
Surrogate TCMX	%	88	88	105	84	104

Organophosphorus Pesticides			
Our Reference		213673-11	213673-12
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2
Type of sample		Soil	Soil
Date extracted	-	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Surrogate TCMX	%	87	86

PCBs in Soil						
Our Reference		213673-1	213673-4	213673-6	213673-7	213673-9
Your Reference	UNITS	BH01/0.4-0.5	BH02/0.4-0.5	BH03/0.4-0.5	BH04/0.1-0.2	BH05/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
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 TCLMX	%	88	88	105	84	104

PCBs in Soil			
Our Reference		213673-11	213673-12
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2
Type of sample		Soil	Soil
Date extracted	-	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019
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	0.2	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	0.2	<0.1
Surrogate TCLMX	%	87	86

Acid Extractable metals in soil						
Our Reference		213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference	UNITS	BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Arsenic	mg/kg	<4	6	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	18	39	7	44	8
Copper	mg/kg	14	37	64	43	49
Lead	mg/kg	36	120	2	120	3
Mercury	mg/kg	0.1	0.1	<0.1	0.8	<0.1
Nickel	mg/kg	20	36	100	50	95
Zinc	mg/kg	63	200	38	280	36

Acid Extractable metals in soil						
Our Reference		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Arsenic	mg/kg	4	<4	8	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	13	26	8	9
Copper	mg/kg	3	31	10	68	11
Lead	mg/kg	10	10	20	3	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	6	50	15	100	6
Zinc	mg/kg	9	32	34	39	20

Acid Extractable metals in soil					
Our Reference		213673-11	213673-12	213673-13	213673-14
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5	BD1/20190316
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	10	11	17	15
Copper	mg/kg	34	17	24	11
Lead	mg/kg	61	21	35	23
Mercury	mg/kg	0.2	<0.1	0.3	<0.1
Nickel	mg/kg	14	29	11	15
Zinc	mg/kg	190	43	67	38

Misc Inorg - Soil					
Our Reference	UNITS	213673-1	213673-5	213673-10	213673-13
Your Reference		BH01/0.4-0.5	BH03/0.1-0.2	BH05/0.4-0.5	BH07/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019
Date analysed	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019
pH 1:5 soil:water	pH Units	9.5	9.5	9.1	8.7

CEC					
Our Reference		213673-1	213673-5	213673-10	213673-13
Your Reference	UNITS	BH01/0.4-0.5	BH03/0.1-0.2	BH05/0.4-0.5	BH07/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019
Date analysed	-	21/03/2019	21/03/2019	21/03/2019	21/03/2019
Exchangeable Ca	meq/100g	4.2	8.1	1.2	15
Exchangeable K	meq/100g	0.1	0.7	<0.1	0.2
Exchangeable Mg	meq/100g	1.1	2.4	0.59	0.75
Exchangeable Na	meq/100g	0.73	3.1	0.62	<0.1
Cation Exchange Capacity	meq/100g	6.1	14	2.5	16

Moisture						
Our Reference		213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference	UNITS	BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Moisture	%	4.2	11	4.8	11	3.7

Moisture						
Our Reference		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Moisture	%	12	6.6	4.7	11	4.4

Moisture					
Our Reference		213673-11	213673-12	213673-13	213673-14
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5	BD1/20190316
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	19/03/2019	19/03/2019	19/03/2019	19/03/2019
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Moisture	%	5.9	5.3	4.2	5.0

Asbestos ID - soils						
Our Reference	UNITS	213673-1	213673-2	213673-3	213673-4	213673-5
Your Reference		BH01/0.4-0.5	BH01/0.9-1.0	BH02/0.1-0.2	BH02/0.4-0.5	BH03/0.1-0.2
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Sample mass tested	g	Approx. 35g	Approx. 30g	Approx. 40g	Approx. 30g	Approx. 35g
Sample Description	-	Beige sandy soil & rocks	Red sandy soil & rocks	Brown sandy soil & rocks	Brown sandy soil & rocks	Brown sandy 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		213673-6	213673-7	213673-8	213673-9	213673-10
Your Reference	UNITS	BH03/0.4-0.5	BH04/0.1-0.2	BH04/0.4-0.5	BH05/0.1-0.2	BH05/0.4-0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	20/03/2019	20/03/2019	20/03/2019	20/03/2019	20/03/2019
Sample mass tested	g	Approx. 30g	Approx. 15g	Approx. 40g	Approx. 45g	Approx. 35g
Sample Description	-	Brown clayey soil & rocks	Brown sandy soil & rocks	Beige sandy soil & rocks	Brown sandy soil & rocks	Brown sandy 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		213673-11	213673-12	213673-13
Your Reference	UNITS	BH06/0.1-0.2	BH07/0.1-0.2	BH07/0.4-0.5
Type of sample		Soil	Soil	Soil
Date analysed	-	20/03/2019	20/03/2019	20/03/2019
Sample mass tested	g	Approx. 30g	Approx. 35g	Approx. 35g
Sample Description	-	Brown sandy soil & rocks	Brown sandy soil & rocks	Red sandy 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
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

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.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	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-003	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-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. 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-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	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-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-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-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	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-016	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-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			21/03/2019	1	21/03/2019	21/03/2019		21/03/2019	21/03/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	106	106
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	106	106
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	110	112
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	118	117
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	102	101
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	101	100
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	105	105
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	113	1	113	108	5	119	113

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]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	21/03/2019	21/03/2019		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	11	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	11	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	11	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	11	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	11	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	11	111	109	2	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			20/03/2019	1	20/03/2019	20/03/2019		20/03/2019	20/03/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	90	102
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	99	117
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	103	82
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	90	102
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	99	117
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	103	82
Surrogate o-Terphenyl	%		Org-003	93	1	95	93	2	79	82

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2019	20/03/2019		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	11	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	11	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	11	93	94	1	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			20/03/2019	1	20/03/2019	20/03/2019		20/03/2019	20/03/2019
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	101	91
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	106	99
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.6	67	113	86
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	0.6	1.0	50	98	69
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.6	1	50	98	69
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.3	0.5	50	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.4	0.6	40	109	98
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.5	0.8	46	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.3	0.4	29	118	102
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	117	1	102	109	7	79	77

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	20/03/2019	20/03/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	0.1	0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	0.1	0.1	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	106	109	3	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	94	78
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	84	67
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	90	71
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	73
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	94	77
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	72
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	110	90
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	99	76
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	81	69
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	66
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	85	1	88	89	1	89	77

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	11	87	86	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	81	85
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	67	76
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	90	100
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	94	116
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	99	61
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	109	96
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	80	84
Surrogate TCMX	%		Org-008	85	1	88	89	1	87	86

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	11	87	86	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date extracted	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	92	94
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	85	1	88	89	1	87	86

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	11	0.2	0.1	67	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	11	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	11	87	86	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	213673-4
Date prepared	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Date analysed	-			19/03/2019	1	19/03/2019	19/03/2019		19/03/2019	19/03/2019
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	103	101
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	114	90
Chromium	mg/kg	1	Metals-020	<1	1	18	19	5	118	94
Copper	mg/kg	1	Metals-020	<1	1	14	13	7	121	108
Lead	mg/kg	1	Metals-020	<1	1	36	30	18	116	84
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.1	0.1	0	107	93
Nickel	mg/kg	1	Metals-020	<1	1	20	18	11	114	84
Zinc	mg/kg	1	Metals-020	<1	1	63	53	17	117	70

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Date analysed	-			[NT]	11	19/03/2019	19/03/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	5	22	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	10	16	46	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	34	22	43	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	61	77	23	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	0.2	0.2	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	14	10	33	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	190	250	27	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			21/03/2019	[NT]	[NT]	[NT]	[NT]	21/03/2019	[NT]
Date analysed	-			21/03/2019	[NT]	[NT]	[NT]	[NT]	21/03/2019	[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-3	[NT]
Date prepared	-			21/03/2019	1	21/03/2019	21/03/2019		21/03/2019	[NT]
Date analysed	-			21/03/2019	1	21/03/2019	21/03/2019		21/03/2019	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	1	4.2	4.2	0	102	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	1	0.1	0.1	0	103	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	1	1.1	1.1	0	98	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	1	0.73	0.70	4	102	[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.

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; 60-140% for organics (+/-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.

Report Comments

Asbestos: A portion of the supplied samples were sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is 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.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of sample 1.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86469.04	**Suburb:**	Meadowbank	**To:**	Envirolab Services
Project Name:		**Order Number**			12 Ashley Street, Chatswood
Project Manager:	PG	**Sampler:**	CL	**Attn:**	Aileen
Emails:	paul.gorman/celine.li @douglaspartners.com.au			**Phone:**	612 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑			**Email:**	ahie@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	Lab ID	Date Sampled	Sample Type	Container	Combo 3a	Combo 8a	Combo3	CEC and pH					
BH01/0.4-0.5	1		Soil	G		X		X					
BH01/0.9-1.0	2		Soil	G	X								
BH02/0.1-0.2	3		Soil	G	X								
BH02/0.4-0.5	4		Soil	G		X							
BH03/0.1-0.2	5		Soil	G	X			X					
BH03/0.4-0.5	6		Soil	G		X							
BH04/0.1-0.2	7		Soil	G		X							
BH04/0.4-0.5	8		Soil	G	X								
BH05/0.1-0.2	9		Soil	G		X							
BH05/0.4-0.5	10		Soil	G	X			X					
BH06/0.1-0.2	11		Soil	G		X							
BH07/0.1-0.2	12		Soil	G		X							
BH07/0.4-0.5	13		Soil	G	X			X					
BD1/20190316	14		Soil	G			X						Intra lab
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐

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

Job No: 213673
Date Received: 18/3/19
Time Received: 13:40
Received by: LN
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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:

Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd

Phone: **Fax:**

Signed: 18/3/19

Date & Time: 18/3/19 13:40

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Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86469.04	**Suburb:**	Meadowbank	**To:**	Envirolab Services
Project Name:		**Order Number**			12 Ashley Street, Chatswood
Project Manager:	PG	**Sampler:**	CL	**Attn:**	Aileen
Emails:	paul.gorman/celine.li @douglaspartners.com.au			**Phone:**	612 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑			**Email:**	ahie@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	Lab ID	Sampling Da	Sample Type	Container	Analytes									Notes/preservation
							Combo 3	BTEX						
BD2/20190317	15		Soil	G			X							Inter lab
Trip Spike	15		Soil	G				X						
Trip Blank	13		Soil	G				X						
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:

Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd

Phone: **Fax:**

Signed:

Date & Time: 18/3/19 13:40

LILY NOTT

213673

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 213673-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Celine Li
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**86469.04, Meadowbank**
Number of Samples	16 Soil
Date samples received	18/03/2019
Date completed instructions received	26/03/2019

Analysis Details

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

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

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

Report Details

Date results requested by	02/04/2019
Date of Issue	29/03/2019

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Steven Luong, Organics Supervisor

Authorised By

Jacinta Hurst, Laboratory Manager

PAHs in TCLP (USEPA 1311)		
Our Reference		213673-A-4
Your Reference	UNITS	BH02/0.4-0.5
Type of sample		Soil
Date extracted	-	27/03/2019
Date analysed	-	28/03/2019
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	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
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	NIL (+)VE
Surrogate p-Terphenyl-d14	%	87

Metals in TCLP USEPA1311			
Our Reference	UNITS	213673-A-2	213673-A-4
Your Reference		BH01/0.9-1.0	BH02/0.4-0.5
Type of sample		Soil	Soil
Date extracted	-	27/03/2019	27/03/2019
Date analysed	-	27/03/2019	27/03/2019
pH of soil for fluid# determ.	pH units	7.6	8.9
pH of soil TCLP (after HCl)	pH units	1.8	1.8
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.0	5.0
Lead in TCLP	mg/L	<0.03	<0.03

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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Date analysed	-			28/03/2019	[NT]	[NT]	[NT]	[NT]	28/03/2019	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	78	[NT]
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	87	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	90	[NT]
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	81	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	82	[NT]
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	94	[NT]
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	99	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Date analysed	-			27/03/2019	[NT]	[NT]	[NT]	[NT]	27/03/2019	[NT]
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	[NT]	[NT]	103	[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.

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; 60-140% for organics (+/-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.

Andrew Fitzsimons

From: Nancy Zhang
Sent: Tuesday, 26 March 2019 10:21 AM
To: Celine Li
Cc: Samplereceipt
Subject: RE: Results for Registration 213673 86469.04, Meadowbank

Follow Up Flag: Follow up
Flag Status: Flagged

Ref: 213673-A
TAT: std
Due: 2/4/19

Hi Celine,

No problem, will do.

Regards,

Nancy Zhang | Laboratory Manager, Sydney | Envirolab Services Pty Ltd

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201
E nzhang@envirolab.com.au | **W** www.envirolab.com.au

From: Celine Li [mailto:Celine.Li@douglaspartners.com.au]
Sent: Tuesday, 26 March 2019 10:14 AM
To: Nancy Zhang <NZhang@envirolab.com.au>
Subject: RE: Results for Registration 213673 86469.04, Meadowbank

Hi Nancy,

Could we please schedule TCLP testing on the following samples:

BH01/0.9-1.0 –Lead; -2
BH02/0.4-0.5 – Lead and B(a)P. -4

Standard TAT please.

Thanks,

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 213673-B

Client Details

Client	Douglas Partners Pty Ltd
Attention	Celine Li
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**86469.04, Meadowbank**
Number of Samples	16 Soil
Date samples received	18/03/2019
Date completed instructions received	01/04/2019

Analysis Details

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

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

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

Report Details

Date results requested by	08/04/2019
Date of Issue	08/04/2019

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Results Approved By
Alexander Mitchell Maclean, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

Metals in TCLP USEPA1311			
Our Reference		213673-B-3	213673-B-9
Your Reference	UNITS	BH02/0.1-0.2	BH05/0.1-0.2
Type of sample		Soil	Soil
Date extracted	-	08/04/2019	08/04/2019
Date analysed	-	08/04/2019	08/04/2019
pH of soil for fluid# determ.	pH units	9.8	9.5
pH of soil TCLP (after HCl)	pH units	1.8	1.8
Extraction fluid used	-	1	1
pH of final Leachate	pH units	5.1	5.1
Nickel in TCLP	mg/L	0.2	0.2

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.

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			08/04/2019	[NT]	[NT]	[NT]	[NT]	08/04/2019	[NT]
Date analysed	-			08/04/2019	[NT]	[NT]	[NT]	[NT]	08/04/2019	[NT]
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	[NT]	[NT]	110	[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.

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; 60-140% for organics (+/-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.

Andrew Fitzsimons

From: Nancy Zhang
Sent: Monday, 1 April 2019 10:44 AM
To: Celine Li
Cc: Samplereceipt
Subject: RE: Results for Registration 213673 86469.04, Meadowbank

Follow Up Flag: Follow up
Flag Status: Flagged

Ref: 213673-B
TAT: Std
Due: 8/4/19

Hi Celine,

No problem, will do.

Regards,

Nancy Zhang | Laboratory Manager, Sydney | Envirolab Services Pty Ltd

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 F 612 9910 6201
E nzhang@envirolab.com.au | W www.envirolab.com.au

Please note that all samples submitted to the Envirolab Group laboratories will be analysed under the Envirolab Group Terms and Conditions. The Terms and Conditions are accessible by clicking this link

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From: Celine Li [mailto:Celine.Li@douglaspartners.com.au]
Sent: Monday, 1 April 2019 8:49 AM
To: Nancy Zhang <NZhang@envirolab.com.au>
Subject: RE: Results for Registration 213673 86469.04, Meadowbank

Hi Nancy,

Can we please schedule TCLP testing for Nickel on samples BH02/0.1-0.2 and BH05/0.1-0.2?

Thanks,

Celine Li | Environmental Engineer/Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 9809 0666 | F: 02 9809 4095 | M: 0428 199 646 | E: Celine.Li@douglaspartners.com.au

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

CERTIFICATE OF ANALYSIS 214377

Client Details

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

Sample Details

Your Reference	**86469.04, Meadowbank TAFE**
Number of Samples	3 water
Date samples received	27/03/2019
Date completed instructions received	27/03/2019

Analysis Details

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

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

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

Report Details

Date results requested by	03/04/2019
Date of Issue	03/04/2019

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

Results Approved By
Giovanni Agosti, Group Technical Manager
Jeremy Faircloth, Operations Manager, Sydney
Nancy Zhang, Laboratory Manager, Sydney
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Organics Supervisor

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water				
Our Reference	UNITS	214377-1	214377-2	214377-3
Your Reference		BH01	TS	TB
Date Sampled		27/03/2019	25/03/2019	25/03/2019
Type of sample		water	water	water
Date extracted	-	28/03/2019	28/03/2019	28/03/2019
Date analysed	-	29/03/2019	29/03/2019	29/03/2019
TRH C_6 - C_9	µg/L	<10	[NA]	<10
TRH C_6 - C_{10}	µg/L	<10	[NA]	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	[NA]	<10
Benzene	µg/L	<1	100%	<1
Toluene	µg/L	<1	100%	<1
Ethylbenzene	µg/L	<1	105%	<1
m+p-xylene	µg/L	<2	105%	<2
o-xylene	µg/L	<1	105%	<1
Naphthalene	µg/L	<1	[NA]	<1
Surrogate Dibromofluoromethane	%	111	116	108
Surrogate toluene-d8	%	96	97	97
Surrogate 4-BFB	%	103	100	100

svTRH (C10-C40) in Water		
Our Reference		214377-1
Your Reference	UNITS	BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	29/03/2019
Date analysed	-	30/03/2019
TRH C_{10} - C_{14}	µg/L	<50
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	124

PAHs in Water		
Our Reference	UNITS	214377-1
Your Reference		BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	29/03/2019
Date analysed	-	01/04/2019
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	108

OCP in water		
Our Reference		214377-1
Your Reference	UNITS	BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	29/03/2019
Date analysed	-	29/03/2019
HCB	µg/L	<0.2
alpha-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
beta-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endosulfan II	µg/L	<0.2
pp-DDT	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Surrogate TCMX	%	89

OP Pesticides in water		
Our Reference	UNITS	214377-1
Your Reference		BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	29/03/2019
Date analysed	-	29/03/2019
Azinphos-methyl (Guthion)	µg/L	<0.2
Bromophos ethyl	µg/L	<0.2
Chlorpyriphos	µg/L	<0.2
Chlorpyriphos-methyl	µg/L	<0.2
Diazinon	µg/L	<0.2
Dichlorvos	µg/L	<0.2
Dimethoate	µg/L	<0.2
Ethion	µg/L	<0.2
Fenitrothion	µg/L	<0.2
Malathion	µg/L	<0.2
Parathion	µg/L	<0.2
Ronnel	µg/L	<0.2
Surrogate TCMX	%	89

PCBs in Water		
Our Reference		214377-1
Your Reference	UNITS	BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	29/03/2019
Date analysed	-	29/03/2019
Aroclor 1016	µg/L	<2
Aroclor 1221	µg/L	<2
Aroclor 1232	µg/L	<2
Aroclor 1242	µg/L	<2
Aroclor 1248	µg/L	<2
Aroclor 1254	µg/L	<2
Aroclor 1260	µg/L	<2
Surrogate TCLMX	%	89

Total Phenolics in Water		
Our Reference		214377-1
Your Reference	UNITS	BH01
Date Sampled		27/03/2019
Type of sample		water
Date extracted	-	03/04/2019
Date analysed	-	03/04/2019
Total Phenolics (as Phenol)	mg/L	<0.05

HM in water - dissolved		
Our Reference		214377-1
Your Reference	UNITS	BH01
Date Sampled		27/03/2019
Type of sample		water
Date prepared	-	29/03/2019
Date analysed	-	29/03/2019
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	0.1
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	13
Lead-Dissolved	µg/L	26
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	13
Zinc-Dissolved	µg/L	100

Method ID	Methodology Summary
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	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-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			28/03/2019	[NT]	[NT]	[NT]	[NT]	28/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	105	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	108	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	114	[NT]	[NT]	[NT]	[NT]	116	[NT]
Surrogate toluene-d8	%		Org-016	97	[NT]	[NT]	[NT]	[NT]	95	[NT]
Surrogate 4-BFB	%		Org-016	105	[NT]	[NT]	[NT]	[NT]	106	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	94	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	84	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	94	[NT]
Surrogate o-Terphenyl	%		Org-003	107	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			01/04/2019	[NT]	[NT]	[NT]	[NT]	01/04/2019	[NT]
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	72	[NT]
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	83	[NT]
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	77	[NT]
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	70	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: OCP in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
HCB	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	83	[NT]
gamma-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	79	[NT]
Heptachlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	79	[NT]
delta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	79	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	86	[NT]
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	86	[NT]
Dieldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	103	[NT]
Endrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	80	[NT]
pp-DDD	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	77	[NT]
Endosulfan II	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	80	[NT]
Methoxychlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	90	[NT]	[NT]	[NT]	[NT]	79	[NT]

QUALITY CONTROL: OP Pesticides in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	106	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
Dimethoate	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Fenitrothion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	113	[NT]
Malathion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	104	[NT]
Parathion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	103	[NT]
Ronnel	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	107	[NT]
Surrogate TCMX	%		Org-008	90	[NT]	[NT]	[NT]	[NT]	89	[NT]

QUALITY CONTROL: PCBs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Aroclor 1016	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	123	[NT]
Aroclor 1260	µg/L	2	Org-006	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	90	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: Total Phenolics in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			03/04/2019	[NT]	[NT]	[NT]	[NT]	03/04/2019	[NT]
Date analysed	-			03/04/2019	[NT]	[NT]	[NT]	[NT]	03/04/2019	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Date analysed	-			29/03/2019	[NT]	[NT]	[NT]	[NT]	29/03/2019	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	103	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[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.

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; 60-140% for organics (+/-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.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86469.04	**Suburb:**	Meadowbank	**To:**	Envirolab Services
Project Name:	Meadowbank TAFE	**Order Number**			12 Ashley Street, Chatswood
Project Manager:	PG	**Sampler:**	CL	**Attn:**	Aileen
Emails:	kurt.plambeck/celine.li @douglaspartners.com.au			**Phone:**	612 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑			**Email:**	ahie@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	Lab ID	Date Sampled	Sample Type	Container	Combo 8	BTEX								
BH01	1	27/03/19	Water	G/P	X									
TS	2	27/3/19	"	"		X								
TB	3	"	"	"		X								
														Intra lab

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

Job No: 214377
Date Received: 27/3/19
Time Received: 14:07
Received by: SZ
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

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	**Lab Report/Reference No:**
Metals to Analyse: 8HM unless specified here:	
Total number of samples in container:	**Transported to laboratory by:**
Send Results to: Douglas Partners Pty Ltd	**Phone:** **Fax:**
Signed: 27/3/19	**Date & Time:** 27/3/19 SZ Kevin Ng

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1908465**	Page	: 1 of 6
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 32378900	Telephone	: +6138549 9630
Project	: 86469.04	Date Samples Received	: 19-Mar-2019 17:40
Order number	:	Date Analysis Commenced	: 21-Mar-2019
C-O-C number	: ----	Issue Date	: 26-Mar-2019 19:27
Sampler	: CL		
Site	: Meadowbank		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BD1/20190317	----	----	----	----
				Client sampling date / time	[18-Mar-2019]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1908465-001	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		6.0	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		6	----	----	----	----
Copper	7440-50-8	5	mg/kg		60	----	----	----	----
Lead	7439-92-1	5	mg/kg		<5	----	----	----	----
Nickel	7440-02-0	2	mg/kg		143	----	----	----	----
Zinc	7440-66-6	5	mg/kg		46	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BD1/20190317	----	----	----	----
				Client sampling date / time	[18-Mar-2019]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1908465-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**81.8**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**86.0**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**57.3**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**91.8**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**84.9**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**84.1**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**92.8**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**106**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BD1/20190317	----	----	----	----
				Client sampling date / time	[18-Mar-2019]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1908465-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**107**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1908465**	Page	: 1 of 7
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 32378900	Telephone	: +6138549 9630
Project	: 86469.04	Date Samples Received	: 19-Mar-2019
Order number	:	Date Analysis Commenced	: 21-Mar-2019
C-O-C number	: ----	Issue Date	: 26-Mar-2019
Sampler	: CL		
Site	: Meadowbank		
Quote number	: EN/222		
No. of samples received	: 1		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2248065)									
ES1908465-001	BD1/20190317	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	143	152	6.52	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	60	66	9.18	0% - 50%
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	46	50	8.98	No Limit
EW1901183-004	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	14	13	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	9	9	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	28	27	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	22	21	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	47	46	0.00	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2248742)									
ES1908458-002	Anonymous	EA055: Moisture Content	----	0.1	%	9.0	7.7	15.4	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2248066)									
ES1908465-001	BD1/20190317	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EW1901183-004	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2247396)									
ES1908443-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2247396) - continued									
ES1908443-001	Anonymous	EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1908475-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2247397)									
ES1908443-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2247397) - continued									
ES1908475-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2247948)									
ES1908475-024	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1908475-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2247397)									
ES1908443-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1908475-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2247948)									
ES1908475-024	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1908475-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2247948)									
ES1908475-024	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1908475-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2248065)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	99.3	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.3	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	87.5	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	102	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	107	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	99.9	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	101	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2248066)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	72.2	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2247396)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	100	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	104	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	99.3	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	101	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	106	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	105	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	105	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	105	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	93.3	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	97.2	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	89.2	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	95.2	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	98.0	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	76.6	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	77.9	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	73.1	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2247397)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	98.2	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	95.8	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	90.6	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2247948)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	75.9	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2247397)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2247397) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	96.4	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	94.5	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	79.8	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2247948)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	75.8	68	128
EP080: BTEXN (QCLot: 2247948)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	88.1	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	85.2	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	80.0	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	78.4	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	82.5	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	86.2	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2248065)							
ES1908465-001	BD1/20190317	EG005T: Arsenic	7440-38-2	50 mg/kg	100	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	97.4	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.8	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	104	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	95.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	124	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	99.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2248066)							
ES1908465-001	BD1/20190317	EG035T: Mercury	7439-97-6	5 mg/kg	82.3	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2247396)							
ES1908475-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	96.6	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	102	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2247397)							
ES1908475-002	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	106	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	114	53	131

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2247397) - continued							
ES1908475-002	Anonymous	EP071: C29 - C36 Fraction	----	1714 mg/kg	112	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2247948)							
ES1908475-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	104	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2247397)							
ES1908475-002	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	105	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	118	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	104	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2247948)							
ES1908475-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	70	130
EP080: BTEXN (QCLot: 2247948)							
ES1908475-002	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	98.1	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	100	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	95.6	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	96.6	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	80.6	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1908465**	Page	: 1 of 4
Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Telephone	: +6138549 9630
Project	: 86469.04	Date Samples Received	: 19-Mar-2019
Site	: Meadowbank	Issue Date	: 26-Mar-2019
Sampler	: CL	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	1	11	9.09	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / *Container* / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BD1/20190317	**18-Mar-2019**	**----**	----	----	**21-Mar-2019**	01-Apr-2019	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	14-Sep-2019	✓	**21-Mar-2019**	14-Sep-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	15-Apr-2019	✓	**22-Mar-2019**	15-Apr-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	01-Apr-2019	✓	**21-Mar-2019**	30-Apr-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	01-Apr-2019	✓	**22-Mar-2019**	01-Apr-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080)							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	01-Apr-2019	✓	**22-Mar-2019**	01-Apr-2019	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
BD1/20190317	**18-Mar-2019**	**21-Mar-2019**	01-Apr-2019	✓	**22-Mar-2019**	01-Apr-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	11	**9.09**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1908465**

Client	: **DOUGLAS PARTNERS PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR PAUL GORMAN	Contact	: Shirley LeCornu
Address	: PO BOX 472 96 HERMITAGE ROAD WEST RYDE NSW, AUSTRALIA 1685	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: paul.gorman@douglaspartners.com.au	E-mail	: shirley.lecornu@Alsglobal.com
Telephone	: +61 07 32378900	Telephone	: +6138549 9630
Facsimile	: +61 07 32378999	Facsimile	: +61-2-8784 8500
Project	: 86469.04	Page	: 1 of 2
Order number	:	Quote number	: EM2017DOUPAR0002 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: Meadowbank		
Sampler	: CL		

Dates

Date Samples Received	: 19-Mar-2019 17:40	Issue Date	: 20-Mar-2019
Client Requested Due Date	: 26-Mar-2019	Scheduled Reporting Date	: **26-Mar-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 23.7 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA055-103 Moisture Content	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1908465-001	[18-Mar-2019]	BD1/20190317	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS BRISBANE		
- A4 - AU Tax Invoice (INV)	Email	brisbane@douglaspartners.com.au
ACCOUNTS PAYABLE		
- A4 - AU Tax Invoice (INV)	Email	accounts@douglaspartners.com.au
CELINE LI		
- *AU Certificate of Analysis - NATA (COA)	Email	celine.li@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	celine.li@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	celine.li@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	celine.li@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	celine.li@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	celine.li@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	celine.li@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	celine.li@douglaspartners.com.au
PAUL GORMAN		
- *AU Certificate of Analysis - NATA (COA)	Email	paul.gorman@douglaspartners.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	paul.gorman@douglaspartners.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	paul.gorman@douglaspartners.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	paul.gorman@douglaspartners.com.au
- Chain of Custody (CoC) (COC)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ENMRG (ENMRG)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - ESDAT (ESDAT)	Email	paul.gorman@douglaspartners.com.au
- EDI Format - XTab (XTAB)	Email	paul.gorman@douglaspartners.com.au

07 3237 8900

Douglas Partners
Geotechnics | Environment | Groundwater 02 9809 0666

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86469.04	**Suburb:** Meadowbank	**To:** Envirolab Services
Project Name:		**Order Number**	12 Ashley Street, Chatswood
Project Manager:	PG 0427 949 878	**Sampler:** CL	**Attn:** Aileen
Emails:	paul.gorman/celine.li @douglaspartners.com.au		**Phone:** 612 9910 6200
Date Required:	Same day ☐ 24 hours ☐ 48 hours ☐ 72 hours ☐ Standard ☑		**Email:** ahie@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	Lab ID	Sampling Da	Sample Type	Containe r	Analytes								Notes/preservation
							Combo 3	BTEX					
BD2/20190317	15	BD1-110903	Soil	G			X						Inter lab
Trip Spike	15		Soil	G				X					
Trip Blank	16		Soil	G				X					
		As per Celine, test											
		Sample BD1 which											
		was received 20-3-19 AS											
PQL (S) mg/kg													ANZECC PQLs req'd for all water analytes ☐

Environmental Division Sydney
Work Order Reference
ES1908465
Telephone : +61-2-8784 8555

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

Lab Report/Reference No:

Metals to Analyse: 8HM unless specified here:

Total number of samples in container:

Transported to laboratory by:

Send Results to: Douglas Partners Pty Ltd

Phone: **Fax:**

Signed:

Date & Time: 18/3/19 13:40

Relinq'd 19/3/2019 R. 19/3/19 JUSTIN 5.40pm LILY NOTT

213673