Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Detailed Site Investigation

Randwick Campus Redevelopment
Bound by High, Magill, Hospital and Botany Streets,
Randwick

Prepared for
LendLease Building Pty Limited

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

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1. Introduction

Douglas Partners Pty Ltd (DP) was commissioned by Lend Lease Building Pty Ltd to undertake a detailed site investigation (DDSI) for contamination for the proposed Randwick Campus Redevelopment (RCR) project at the site bound by Hospital Road, High Street, Botany Street and Magill Street (the site, as shown on Drawing 1, Appendix A). The investigation was carried out in accordance with DP's initial proposal SYD180227 dated 4 June 2018, and subsequent variations.

It is understood that the RCR project will be undertaken in two stages (Stage 1 and Stage 2), and is proposed to include development of a new multi-storey Acute Services Building (ASB), future regrading of Hospital Road, a pedestrian tunnel and bridge to link the existing Sydney Children's Hospital to the new ASB, and a proposed Stage 2 development site to the north of the ASB. Further details of the proposed development are provided in Section 4.

DP has previously undertaken a PSI at the site as reported in *Report on Preliminary Site Investigation for Contamination, Randwick Campus Redevelopment, Hospital Road and High, Magill and Botany Streets, Randwick,* Project 72505.12.R.001.Rev2 dated February 2018 (DP, 2018). Fieldwork as part of DP (2018) was undertaken in September and October 2017, and January 2018, however, it is noted that due to access restrictions, not all proposed testing locations could be completed.

The current investigation comprised a further round of soil sampling during the pre-demolition phase, at some property locations which previously could not be accessed, together with a round of groundwater sampling and testing. The findings from DP (2018) have been incorporated into the current report. The objective of this DSI is to assess the potential for contamination of the site based on past and present site use, and to comment on the need for further investigation and/or management (if required).

2. Scope of Works

DP carried out the following scope of work as part of the DSI:

- Review of DP (2018) and any other relevant reports;
- Drilling of twelve bores (BH201, and BH205 to BH215) to a minimum depth of 0.5 m into natural soil or prior refusal using a hand auger;
- Drilling of two bores (BH202 and BH204) to a final depth of 10 m bgl using a solid flight auger and rotary coring techniques;
- Collection of soil samples from the bores at regular depth intervals, at 0.3 m and 1 m in fill, then every 1 m in fill;

- Excavation of 11 test pits (TP1- TP11) to a minimum depth of 1 m into natural soil or prior refusal;
- Collection of soil samples from the test pits at regular depth intervals, at the surface, 0.5 m and 1 m in fill, then every 0.5 m in fill, and one natural sample;
- Screening of all fill samples with a photo-ionisation detector (PID) to assess the likely presence or absence of volatile organic compounds (VOC);
- Laboratory analysis of selected soil samples by a National Association of Testing Authorities (NATA) accredited laboratory for contaminants of potential concern (COPC) and parameters including:
  - Eight priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc);
  - Total recoverable hydrocarbons (TRH);
  - Monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene and xylenes – BTEX);
  - Polycyclic aromatic hydrocarbons (PAH);
  - Organochlorine pesticides (OCP), organophosphorus pesticides (OPP);
  - Polychlorinated biphenyls (PCB);
  - Total phenols;
  - Asbestos (presence / absence);
  - pH, cation exchange capacity (for determination of site specific environmental investigation levels); and
  - Toxicity characteristic leaching procedure (TCLP) testing on metals and PAH (for an indicative waste classification).
- Installation of two groundwater wells (BH202 and BH204);
- Development and collection of groundwater samples from BH202 and BH204, as well as previously installed wells (BH11, BH14, BH16 and BH17) using low-flow sampling techniques;
- Laboratory analysis of selected groundwater samples by a NATA accredited laboratory for the following COPC:
  - Eight priority metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc;
  - TRH;
  - BTEX;
  - PAH; and
  - VOC.
- Interpretation of results in accordance with current NSW Environment Protection Authority (EPA) endorsed guidelines; and
- Preparation of this report detailing the methodology and results of the investigation; assessment of the suitability of the site for the proposed land use; recommendations for further investigation and / or remediation (if required); and inclusion of a preliminary waste classification in accordance with NSW EPA *Waste Classification Guidelines 2014* (EPA, 2014).

3. Site Identification

The site is located approximately 7 km southeast of the Sydney CBD (Drawing 1, Appendix A). The site is bordered by High Street to the north, Hospital Road to the east, Magill Street to the south and Botany Street to the west. Eurimbla Avenue runs through the centre of the site.

To the east of Hospital Road is the existing Randwick Hospital Campus (the Hospital), currently occupied by numerous multi-storey buildings, a number of car parks, and open space and courtyard areas. Buildings across the Hospital include the Sydney Children's Hospital and Ronald McDonald House, The Prince of Wales Public and Private Hospitals including patient wings, operating theatres and palliative care, and campus services such as staff residences, ambulance station, and childcare facilities. The hospital occupies a total area of approximately 13.5 hectares (ha).

General site information is provided in Table 1 below.

Table 1: General Site Information

Item	Description
Site Name/ Occupier:	Currently numerous owners – yet to be consolidated
Site Address	Bordered by High Street to the north, Hospital Road to the east, Magill Street to the south and Botany Street to the west. Eurimbla Avenue runs through the centre of the site (Drawing 1, Appendix A).
Geographical Co-ordinates	NW corner 336983.93 m E, 6245693.93 m S NE corner 337114.86 m E, 6245670.41 m S SW corner 336939.61 m E, 6245434.73 m S SE corner 337071.19 m E, 6245400.69 m S
Local Government Authority	Randwick City Council
County/Parish	Parish of Alexandria and the County of Cumberland
Total Site Area	Approximately 3.3 ha
Current Zoning	R2 – Low density residential; and R3 – Medium density residential, with the Hospital Road site zoned SP2 Infrastructure Health Services Facility by Randwick Local Environmental Plan 2012.
Current Site Use	Residential with some commercial/medical
Proposed Future Land Use	Hospital and health care

The land uses surrounding the Hospital include:

- *North* – High Street is present to the north, beyond which is a mixture of residential and commercial properties. At the intersection of High, Avoca Streets and Belmore Road is a convenience store to the north and a street based shopping centre. Further to the north east is Randwick shopping centre complex;

- *East* – Hospital Road and Randwick Hospital (described above) followed by Avoca Street located to the east. Beyond this is open space parkland, located at the junction of Avoca Street and Belmore Road. Residential properties are also located to the east of Avoca Street. Further east is Brigidine College, comprising a number of multi-storey buildings and open space areas;
- *South* – Magill Street located to the south of the site is predominantly residential; and
- *West* – Botany Street is located to the west followed by the University of NSW, Biomedical Campus which has been the subject of previous investigations by DP and was previously part of the larger university site which had previously been quarried for igneous clays from a dyke/ diatreme previously identified at the site. The quarry was subsequently backfilled. The historical aerial photographs indicated that the quarry/landfill extends beyond the boundary of the current development. Following completion of quarrying (to depths of approximately 4.5 m to 9.0 m based on field observations), the area appears to have been backfilled in an uncontrolled manner and has since been used for internal roadways and parking by the university.

Details of the site geology, topography and hydrogeology can be found in Section 4 of DP (2018).

4. Proposed Development

It is understood that the proposed RCR will include:

- A new multi-storey Acute Services Building (ASB), about 150 m by 130 m in area, including a new emergency department, extra beds, expanded rehab and ambulatory care facilities and new shared operating theatres for the Randwick Campus. The lowest basement level -02 will extend to RL 47 m. This will require excavation to depths of up to 8 m, with the deepest part of the excavation being at the northern end (Stage 1). Working column loads are understood to be up to 15,000 kN;
- Potential future regrading of Hospital Road to surface levels of RL 50.5 m to RL 54.4 m. This will require excavation to depths of up to about 6 m within the middle area and reducing to the existing ground surface levels at each end near High and Magill Streets (Stage 1);
- A potential future tunnel below the new Hospital Road to link the existing Sydney Children's Hospital to the new building. The proposed invert level of the tunnel is at about RL 47 m (i.e. similar to the proposed basement level -02). It is anticipated that this tunnel will require excavation of about 3 m further below the proposed Hospital Road level, and will be constructed as a cut-and-cover tunnel;
- Separate patient and public bridges over Hospital Road; and
- A potential future Stage 2 development site to the north of the proposed ASB and extending up to High Street. It is anticipated that a similar size development to that of Stage 1 will be planned.

5. Previous Investigation

DP (2018) reported on a PSI for contamination at the site for the proposed RCR. The PSI included a review of site history information, a site walkover, intrusive investigation, laboratory analysis and reporting. Due to access restrictions, it was not possible to complete all proposed bore locations.

5.1 Site History Summary

A summarised version of the site history information reported in DP (2018) is provided below.

Aerial Photographs

Aerials photographs from 1943 to 2014 were reviewed to provide an indication of past land uses and identify possible sources of contamination. The review indicated that the residential properties along Eurimbla Ave, Botany Street and Hospital Road were built during or prior to 1943, with little change observed over the years. In 1991, a number of properties on the site were extended to the rear, with more extensions observed in the 2000 aerial. The overall layout however remained much the same as in previous years.

With regards to the surrounding land, in the 1943 aerial, residential properties were evident to the north and south of the site. To the west, the UNSW site appeared to be vacant, and the large quarried areas to the west of Botany Street appeared to have been filled. To the east, parts of the hospital site were undeveloped. In 1955, an increased density of housing was observed to the south of the site, and construction works were noted within the UNSW site in 1961. Over the years 1970 to 2014, further commercial/ industrial development was evident throughout the surrounding subdivision, notably the continued development of the hospital and UNSW sites.

Historical Title Deeds

A historical title deeds search was conducted on selected lots within the site, which were selected based on having potential for commercial / retail land use. Records dating as far back as 1910 indicated that the potential land activities were predominately residential, with some commercial / medical, education and health institution land use.

Lotsearch Results

The site is zoned R2 – Low density residential and R3 – Medium density residential, with the Hospital Road site zoned SP2 Infrastructure Health Services Facility by Randwick Local Environmental Plan 2012.

A number of state and local heritage items were listed in the vicinity of the site, the closest being:

- The Cotswold, late Victorian cottage – 50 m South of the site; and
- Blenheim House and outbuilding - 82 m North East of the site.

The closest dry cleaners and motor garages, considered to be high risk in terms of contamination were more than 180 m from the site, and therefore were not considered to be a source of contamination to the site.

Regulatory Notice Search

A search of the NSW EPA website on 5 October 2018 indicated that:

- No notices or orders made under the CLM Act have been issued for the site or adjacent properties; and

- No licences under Schedule 1 of the POEO Act have been issued for the site or adjacent properties.

5.2 DP (2018) Site Walkover

Full access was not possible to the various residences at the time of DP (2018) investigation; therefore, observations were limited to the property exteriors from street view. The walkover was undertaken by a DP environmental scientist on 10 October 2017. In summary, the properties were mainly single storey with a few double storey and bungalow-style properties. The structures were generally constructed of brick / rendered brick with terracotta roofing. Possible fibro eaves / fibro carport were observed in some properties. A commercial-style building with aluminium roofing and consolidated commercial medical rooms (orthodontics) were also noted during the walkover.

5.3 DP (2018) Intrusive Investigation

Intrusive investigations as part of DP (2018) were undertaken in two stages. The initial fieldwork (undertaken in September and October 2017) for the PSI was carried out in conjunction with a geotechnical investigation and as such, the bore locations were positioned primarily for geotechnical investigation purposes in areas where access was available. A total of seven boreholes (BH1 to BH7) were drilled in the initial round, with one of the bores (BH7) converted into a groundwater monitoring well.

Bores were drilled to depths of between 16 m and 20.5 m bgl using a bobcat-mounted or truck-mounted drilling rig using solid flight auger and rotary drilling. Bores were located within the existing roads, except BH7 which was drilled within a residential property.

The well at BH7 was installed to a depth of approximately 20.5 m bgl to allow measurement of the groundwater level and collection of groundwater samples for environmental testing. The well details were as follows: screen 4.0 m to 20.47 m; gravel 5.0 m to 20.47 m; bentonite 3.5 m to 5.0 m; backfill surface to 3.5 m with concrete set. Following well development, groundwater sampling was undertaken on 13 October 2017 using the low flow pump.

A second round of fieldwork was undertaken on 9 – 11 January 2018 and involved hand augering of 22 boreholes (BH101 to BH122) across 11 properties. Two boreholes were augured at each property, one in the front yard and one in the backyard, to depths of 1.5 m or the top of natural. In addition, two boreholes were drilled (BH8 and BH9) and sampled.

5.4 DP (2018) Recommendations

The field and laboratory results for soil and groundwater are discussed in Sections 9 & 10 of the current report. Based on the desktop study, field and analytical results reported in DP (2018), it was considered that the site in general has a low potential for contamination with respect to the proposed hospital development.

DP (2018) recommended the following:

- Further testing on properties located within the site and owned by Health Infrastructure and/or UNSW to determine if there are any hazardous substances which may influence waste classification (explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances);
- Pre-demolition hazardous building materials survey of the building structures which comprise the site. It is noted that many of the premises appear to contain some asbestos and other hazardous materials;
- Post demolition clearance for surface asbestos containing materials (ACM) by an experienced occupational hygienist;
- Additional soil and groundwater sampling and testing across the site to more thoroughly:
  - Assess the presence of complete source-pathway-receptor linkages under the CSM;
  - Assess the suitability of any fill/natural material to remain under the proposed development. DP notes the majority of the fill at the site will be removed during excavation works to reach final levels;
  - To remain under the proposed development;
  - Determine the need for any soil or groundwater remediation; and
  - Assess the re-use potential and/or waste classification of roadbase, filling and natural soils.

Apart from additional groundwater monitoring bores, DP (2018) recommended that the post-demolition investigations be undertaken using test pits rather than bores to enable a more thorough visual assessment of the potential for the existence and spread of asbestos impact in the soils.

6. Preliminary Conceptual Site Model

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

6.1 Potential Contamination Sources and Contaminants of Concern

Based on the findings of DP (2018), the following potential sources of contamination and associated contaminants of concern have been identified (Table 2).

Table 2: Potential Contamination Sources and Contaminants of Concern

Potential Source	Description of Potential Contaminating Activity	Contaminants of Concern
Imported fill of unknown origin (S1)	Uncontrolled filling: Associated with disturbed terrain in the local area and from the demolition of former buildings/structures on site. Only shallow fill is anticipated across the site.	Heavy metals, TPH, BTEX, PAH, phenols, PCB, OCP, and asbestos.
Hazardous building materials in existing buildings (S2)	Presence of hazardous building materials within the building fabric of the some of the existing buildings.	Asbestos, synthetic mineral fibre (SMF), lead and PCB
Industrial/commercial activities at the site or nearby (S3)	Storage of chemicals or equipment associated with former butcher/ medical practices and orthodontist.	Heavy metals, TRH, BTEX, PAH, phenols, PFAS, VOCs and asbestos.
Neighbouring sites (S4)	Potential migration of contamination associated with the backfilled quarry at the UNSW site. Current operations at the new Biomed building at UNSW.	Asbestos, metals, hydrocarbons (TPH/BTEX) and pharmaceutical solvents (VOCs).

Notes: TRH - total petroleum hydrocarbon
BTEX - benzene, toluene, ethylbenzene, xylene
PAH - polycyclic aromatic hydrocarbons
PCB - polychlorinated biphenyls
OCP - organochlorine pesticides
OPP - organophosphorus pesticides
VOC - volatile organic compounds
PFAS- Perfluorinated Alkylated Substances

6.2 Potential Receptors

6.2.1 Human Health Receptors

R1 Current site users (residents, site workers and visitors);

R2 Construction and maintenance workers;

R3 Final end users (site workers and visitors); and

R4 Land users in adjacent areas (university / hospital / residential / commercial).

6.2.2 Environmental Receptors

R5 Groundwater;

R6 Surface water (Botany Bay); and

R7 Terrestrial ecosystems (neighbouring areas of conservations such as Centennial Park, Queens Park and Eastlakes).

6.2.3 Potential Pathways

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

P1 Ingestion and dermal contact;

P2 Inhalation of dust and/or vapour;

P3 Leaching of contaminants and vertical migration into groundwater (Eastlakes/Botany Bay);

P4 Surface water run-off (Centennial Park/Coogee);

P5 Lateral migration of groundwater; and

P6 Contact with terrestrial ecology (Centennial Park).

6.3 Summary of Preliminary CSM

A 'source – pathway – receptor' approach has been used to assess the potential risks of harm being caused to human, water 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 S4) and receptors (R1 to R7) are provided in Table 3 below.

Table 3: Potential Complete Pathways

Source	Pathway	Receptor
S1 Fill of unknown origin S3 Previous industrial/commercial activities at the site	P1: Ingestion and dermal contact	R1: Current site users R2: Construction and maintenance workers R3: Final end users
	P2: Inhalation of dust and/or vapour	R1: Current site users R2: Construction and maintenance workers R3: Final end users (educational/hospital) R4: Land users in adjacent areas (educational/hospital/ residential/commercial/industrial)
	P3: Leaching of contaminants and vertical migration into groundwater	R5: Groundwater
	P4: Surface water run-off P5: Lateral migration of groundwater	R6: Surface water
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology
S2 Hazardous building materials	P1: Ingestion and dermal contact P2: Inhalation of dust and/or vapour	R1: Current site users R2: Construction and maintenance workers R3: Final end users
S4 Neighbouring sites (hospital and UNSW)	P2: Inhalation of vapour generated by contaminated groundwater.	R1: Current site users R2: Construction and maintenance workers R3: Final end users R4: Land users in adjacent areas
	P3: Lateral migration of contaminated groundwater from up-gradient sites	R5: Groundwater R6: Surface water
	P6: Contact with terrestrial ecology	R7: Terrestrial ecology

7. Fieldwork

7.1 Fieldwork Methods and Rationale

Field investigations involving boreholes were undertaken on 25 to 29 June 2018 and 7 and 8 August by DP environmental scientists. Additionally, in August 2018, a further 11 test pits (TP1 – TP11) were excavated under the supervision of a DP environmental scientist to confirm fill depths and enable additional sampling. The field investigation was designed in accordance with the seven step data quality objectives (DQO) process provided in Appendix B, Schedule B2 of the *National Environment Protection (Assessment of Site Contamination*) Measure 1999 as amended 2013 (NEPC, 2013). The DQO adopted for this investigation is provided in Appendix D.

The field work for the boreholes comprised the drilling of twelve boreholes (BH201, and BH205 to BH215) and another two boreholes (BH202 and BH204) which were converted into groundwater monitoring wells (refer to Section 7.3). When combined with the DP (2018) investigation locations, this gives a total of 45 boreholes, which meets the number of sampling points required for a 3.3 ha site, as per the NSW EPA *Sampling Design Guidelines* (1995).

Boreholes BH201 and BH205 to BH215 were drilled to a minimum depth of 0.5 m into natural or prior refusal using a hand auger. The groundwater monitoring wells (BH202 and BH204) were constructed to intercept the water table for monitoring of groundwater levels and for groundwater quality (contamination) sampling purposes. BH202 and BH204 were drilled using a solid flight auger to 3 mbgl and 4.7 mbgl respectively, and to a final depth of 10 mbgl using rotary coring.

The test pits were excavated using a combination of a 1.7 T excavator and hand shovel, depending on site accessibility. The test pits were excavated to a maximum depth of 1.7 m bgl.

The borehole and test pit locations from the current and previous investigations are shown on Drawing 1, Appendix A.

Soil samples were collected from all boreholes and test pits at regular depth intervals, targeting fill layers and any change in the soil profile. Logs were completed for all boreholes and test pits indicating the geological profile observed within each bore and test pit (refer to Appendix C). Logs included, where relevant, sample identification, coordinates, date of collection, a description of the substrate conditions encountered, visual or olfactory evidence of contamination, the depth of samples and QA/QC samples collected, the sampler and equipment used.

Groundwater well development and sampling was undertaken on 29 June and 6 July 2018, respectively, as detailed in Section 7.4 below.

7.2 Soil Sampling Procedure

Sampling data was recorded to comply with routine chain-of-custody requirements and DP's standard operating procedures outlined in the DP *Field Procedures Manual*. The general sampling, handling, transport and tracking procedures are detailed below:

- Soils from the bores were sampled from the tip of the auger (as the presence of volatiles was considered highly unlikely);

- Soils from the test pits were recovered directly from the side walls of the test pit or from the excavator bucket when recovered at depth;
- Disposable nitrile gloves were used to collect all samples. Gloves were replaced prior to the collection of each sample in order to prevent cross-contamination;
- Samples collected for laboratory analysis were transferred into a new laboratory prepared glass jar, with minimal headspace, and sealed with a Teflon lined lid. Each jar was individually sealed to reduce the potential for cross contamination during transportation to the laboratory;
- Sample containers were labelled with individual and unique identification including project number, sample ID, depth and date of sampling;
- Placement of sample containers and bags into a cooled, insulated and sealed container for transport to the laboratory; and
- Field screening of replicate soil samples collected in sealed plastic bags for Total Photoionisable Compounds (TOPIC) using a calibrated photoionisation detector (PID)

7.3 Well Construction Details

The groundwater monitoring 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 wells. The well was capped and a Gatic cover placed flush with the ground surface.

The specific construction details for monitoring wells BH202 and BH204 are presented in Table 4 below.

Table 4: Groundwater Well Construction Details

Construction Details	BH202	BH204
Well installation depth	10.05 m	10.0 m
Screen	3.55 to 10.05 m	5 to 10.0 m
Gravel pack	3.5 to 10.05 m	5 to 10.0 m
Bentonite	3.0 to 3.5 m	4.5 to 5.0 m
Backfill	0.1 to 3.0 m	0.1 to 4.5 m

7.4 Groundwater Sampling Procedure

Following installation of groundwater wells BH102 and BH104, the bores were developed on 29 June 2018 by purging > 3 well volumes using a twister pump. Groundwater sampling was undertaken a week later, on 6 July 2018, and also included sampling of wells at BH11, BH14, BH16 and BH17.

Sampling was undertaken using low-flow sampling techniques utilizing a Geopump. Prior to sampling, field parameters (pH, temperature, dissolved oxygen (DO), conductivity, total dissolved solids (TDS) and redox), which were measured using a calibrated water quality meter, were first allowed to

stabilise. A minimum of three readings, with fluctuations within acceptable limits across all parameters was necessary to achieve stabilization.

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 avoid 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 sample was 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.

7.5 Analytical Rationale

7.5.1 Soil

Based on site observations (odour, staining, etc.) and the location of soil samples within the subsoil strata, selected samples were analysed for the primary contaminants of concern as identified in Section 6. The analytical scheme was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of concern.

Fill samples were analysed from varying depths and fill layers as outlined below, to provide an indication of the vertical extent of potential contamination.

- Where one layer of fill was encountered (i.e. BH204 – BH 206 and BH210 – BH214, TP1 – TP11), one representative sample from the fill was analysed, with the exception of BH211 and BH213 where two samples, at varying depths were analysed;
- Where two distinct layers of fill were encountered, the top layer of fill was analysed in BH201 and BH209, and the underlying fill layer was analysed in BH202, BH207 - BH209 and BH215;
- In BH202, two samples were analysed from the underlying fill layer, at varying depths (0.3 – 0.4 m and 0.9 – 1.0 m); and
- In TP1 – TP11, one sample of natural soil was analysed from varying depths, between 0.4 - 0.5 m and 1.4 – 1.5 m.

7.5.2 Soil & Groundwater

All samples collected were submitted to Envirolab Services Pty Ltd (Envirolab). Envirolab is accredited by the NATA and are required to conduct in – house QA / QC procedures. These are normally incorporated into every analytical run and include assessment of reagent blanks, spike recovery, surrogate recovery and laboratory duplicates. The analytical methods and the in-house QA/QC procedures used are summarised in the laboratory certificates of analysis, included in Appendix E.

8. Site Assessment Criteria

The Site Assessment Criteria (SAC) applied in the current investigation is informed by the CSM which identified human and ecological receptors to potential contamination on the site (refer to Section 6). Analytical results were assessed (as a Tier 1 assessment) against the SAC comprising the investigation and screening levels of Schedule B1, National Environment Protection Council, National Environment Protection Measure 1999, as amended (NEPC, 2013). The NEPC guidelines are endorsed by the EPA under the CLM Act 1997. Petroleum based health screening levels for direct contact have been adopted from the *Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 Health screening levels for petroleum hydrocarbons in soil and groundwater* (2011) as referenced by NEPC (2013).

The investigation and screening levels 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 or where certain land-uses may be more suitable. They are intentionally conservative and are based on a reasonable worst-case scenario.

8.1 Soils Site Assessment Criteria

8.1.1 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. Site-specific conditions may determine the depth to which HILs apply for other land uses.

HSL are applicable to selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact pathways. HSL have been developed 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. Given the proposed land use and based on the CSM (Section 6) the adopted HIL and HSL are:

- **HIL-B & HSLA & B** – residential end use with minimal access to underlying soils for limited parts of the site which may be used for patients and families who require extended periods at the hospital;
- **HIL-C & HSL-C** - public open space (for area to be landscaped);
- **HIL-D & HSL-D** - commercial and industrial end use (continuation of present use); and
- **HSL** – Intrusive Maintenance Worker (shallow trench).

Table 5 shows the HILs that have been adopted by NEPC (2013) Schedule B1, Table 1A(1) for the investigation.

Table 5: Health Investigation Levels

Contaminant	HIL B – Residential (mg/kg)	HIL C – Open Space (mg/kg)	HIL D – Industrial/ Commercial (mg/kg)
Metals and Inorganics			
Arsenic	500	300	3000
Cadmium	150	90	900
Chromium (IV)	500	300	3600
Copper	30,000	17,000	240,000
Lead	1200	600	1,500
Mercury (inorganic)	120	80	730
Nickel	1200	1200	6,000
Zinc	60,000	30,000	400,000
PAH			
Carcinogenic PAH (as benzo(a)pyrene TEQ) [1]	4	3	40
Total PAH	400	300	4000
Phenols			
Pentachlorophenol (used as an initial screen)	130	120	660
OCP			
DDT + DDD + DDE	600	400	3600
Aldrin + Dieldrin	10	10	45
Chlordane	90	70	530
Endosulfan (total)	400	340	2000
Endrin	20	20	100
Hepatchlor	10	10	50
HCB	15	10	80
Methoxychlor	500	400	2500
Other Pesticides			
Chlorpyrifos	340	250	2000
Other Organics			
PCB [2]	1	1	7

Notes:

1 sum of carcinogenic PAH

2 non dioxin-like PCBs only

Table 6 shows the HSLs that have been adopted by NEPC (2013) Schedule B1, Table 1A(3) for the investigation. Based on the borehole logs, the dominant soil type encountered in was sands, therefore

the HSL criteria for sand has been selected. Furthermore, given the general depth of fill encountered in the investigation during the intrusive works, and using the most conservative values, the depth range of 0 m to <1 m has been applied.

Table 6: Soil Health Screening Levels for Vapour Intrusion

Contaminant	Soil Type	HSLA & B Residential (mg/kg)	HSL C Open Space (mg/kg)	HSL D Industrial Commercial (mg/kg)	Intrusive Maintenance Worker
		Depth 0 m to <1m	Depth 0 m to <1m	Depth 0 m to <1m	Depth 0 m to <1m
Toluene	Sand	160	NL	NL	NL
Ethylbenzene		55	NL	NL	NL
Xylenes		40	NL	230	NL
Naphthalene		3	NL	NL	NL
Benzene		0.5	NL	3	77
TRH C_6-C_{10} less BTEX [F1]		45	NL	260	NL
TRH >C_{10}-C_{16} less naphthalene [F2]		110	NL	NL	NL

8.1.2 Ecological Investigation and Screening Levels

Ecological Investigation Levels (EIL) have been derived for selected metals and organic compounds and are applicable for assessing risk to terrestrial ecosystems (NEPC, 2013). EIL depend on specific soil physiochemical properties and land use scenarios and generally apply to the top 2 m of soil, which corresponds to the root zone and habitation zone of many species. The EIL is determined for a contaminant based on the sum of the ambient background concentration (ABC) and an added contaminant limit (ACL).

The ABC of a contaminant is the soil concentration in a specific locality that is the sum of naturally occurring background levels and the contaminants levels that have been introduced from diffuse or non-point sources (e.g. motor vehicle emissions). The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required. ACLs are based on soil characteristics including pH, CEC and clay content.

The EIL is calculated using the following formula:

EIL = ABC + ACL

There are three different methods for determining the ABC, the preferred method being through direct measurement at an appropriate reference site. In situations where an appropriate reference point cannot be determined, the methods detailed in Loszowy et al. (1995) or Hamon et al. (2004) may be used. The full reference of these papers is provided below:

Olszowy, H, Torr, P, Imray, P 1995, Trace element concentrations in soils from rural and urban areas of Australia, Contaminated sites monograph no. 4, South Australian Health

Commission;Hamon, RE, McLaughlin, MJ, Gilkes, RJ, Rate, AW, Zarcinas, B, Robertson, A, Cozens, G, Radford, N & Bettenay, L 2004, Geochemical indices allow estimation of heavy metal background concentrations in soils, Global Biogeochemical Cycles, vol. 18, pp. 1 -6.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising Ni, Cr III, Cu, Zn, Pb, As, DDT and naphthalene. It should be noted that the EIL for As, DDT and naphthalene are generic in that they are not dependent on soil type, whereas the EIL for Ni, C III, Cu, Zn and Pb are site specific. To derive these site specific EILs, an Interactive (Excel) Calculation Spreadsheet was used, which has been provided in the ASC NEPM Toolbox available on the Standing Council on Environment and Water website (http://www.scew.gov.au/node/941).

The adopted EIL, derived from the *Interactive (Excel) Calculation Spreadsheet* are shown in the following Table 7. The following site specific data and assumptions have been used to determine the EILs:

- The EILs will apply to the top 2 m of the soil profile;
- Given the likely source of soil contaminants (i.e. historical site use/fill) the contamination is considered as “aged” (>2 years) and
- ABCs have been derived using the *Interactive (Excel) Calculation Spreadsheet* using input parameters of aged soil, CEC of 2.4 $cmol_c$/kg and pH of 7 with high traffic and clay content of 15%. It should be noted that the EIL values used in DP (2018) have been applied to the current investigation for consistency, and comparability of results.

Table 7: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL Residential Open Space	EIL Commercial Industrial	Comments
Metals	Arsenic	100	160	Adopted pH of 7 and CEC of 2.4 $cmol_c$/kg]; assumed clay content 15% High traffic area (NSW)
	Chromium III	200	320	
	Copper	65	80	
	Lead	1100	1800	
	Nickel	9	10	
	Zinc	240	300	
PAH	Naphthalene	170	370	

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and Benzo(a)pyrene. The inputs into the ESL derivation are presented in Table 8 below, and the adopted ESL values based on Table 1B(6) of NEPM (2013) are shown in Table 9.

Table 8: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 2 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Range of uses	Hospital Masterplan
Soil Texture	Coarse	Based on dominant soil type at the site (see Logs)

Table 9: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL (Residential and open space)	ESL (Industrial Commercial)	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	215	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	170*	
	>C16-C34 [F3]	300	1700	
	>C34-C40 [F4]	2800	3300	
BTEX	Benzene	50	75	
	Toluene	85	135	
	Ethylbenzene	70	165	
	Xylenes	105	180	
PAH	Benzo(a)pyrene	0.7	1.4	

8.1.3 Management Limits

In addition to the application of HSL and ESL, a further screening measure is applicable to petroleum hydrocarbons, which takes into account policy considerations and reflect the nature and properties of petroleum hydrocarbons, including:

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

Management Limits have been adopted in NEPC (2013) as interim Tier 1 guidance to avoid or minimise these potential effects. The criteria have been developed for petroleum fractions F1 to F4. The adopted Management Limits, extracted from Table 1B(7), Schedule B1 of NEPC (2013) are shown in Table 10 below. 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; and

- A sand (i.e. coarse texture) has been adopted, based on the dominant soil type at the site.

Table 10: Management Limits for TRH Fractions in Soil

TRH Fraction	Soil Texture	Management Limit: Residential / Open Space (mg/kg)	Management Limit: Commercial and Industrial (mg/kg)
C_6-C_{10} [F1]	Coarse	700	700
>C_{10}-C_{16} [F2]	Coarse	1,000	1,000
>C_{16}-C_{34} [F3]	Coarse	2,500	3,500
>C_{34}-C_{40} [F4]	Coarse	10,000	10,000

8.1.4 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
- Importation of asbestos contaminated building products from China.

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.

Given the preliminary nature of the investigation the adopted SAC for asbestos is no asbestos detected at the laboratory reporting limit of 0.1 g/kg.

8.1.5 Contaminants with No Assessment Criteria

Where no guidance is provided in NEPC (2013) for a specific analyte, the PQL was used as the initial screening criteria.

If concentrations are recorded above the PQL, reference criteria will be sourced from other national and international guidance as relevant and used to determine the significance of the detected analyte.

8.2 Groundwater Site Assessment Criteria

8.2.1 Groundwater Investigation Levels

The Groundwater Investigation Levels (GIL) listed in Table 1C of NEPC (2013) are based on:

- *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality,* 2000 (ANZECC & ARMCANZ); and
- *Australian Drinking Water Guidelines*.

The potential receptors of impacted groundwater from the site are discussed in Section 6. As a conservative measure, the GILs as shown in Table 11 have been adopted.

Table 11: Groundwater Investigation Levels (in mg/L unless otherwise stated)

Analyte		NEPC (2013)	
		Fresh Water[A]	Drinking Water[B]
Metals	Arsenic (V)	0.013 as As (V)	0.01
	Cadmium	0.0002	0.002
	Chromium (VI)	0.001[C]	0.05
	Copper	0.0014	2
	Lead	0.0034	0.01
	Mercury (total)	0.00006[D]	0.001
	Nickel	0.011	0.02
	Zinc	0.008 [C]	-
PAH	Benzo(a)pyrene	-	0.00001
	Naphthalene	0.016	-
Phenols	Phenol	0.32	-
TPH	C6-C10 – BTEX (F1)	-	-
	C10-C16 – Naphthalene (F2)	-	-
MAH	Benzene	0.95	0.001
	Toluene	-	0.8
	Ethylbenzene	-	0.3
	o-xylene	0.35	0.6
	p-xylene	0.2	
	Styrene	-	0.03

Analyte		NEPC (2013)	
		Fresh Water[A]	Drinking Water[B]
VOC	Chloroethene (vinyl chloride)	-	0.0003
	1,1-Dichloroethene	-	0.03
	1,2-Dichloroethane	-	0.003
	Tetrachloroethene (PCE)	-	0.05
	Chloroform	-	0.003
	1,1,2 - Trichloroethane	6.5	-
	Carbon Tetrachloride	-	0.003
	1,2-Dichlorobenzene	0.16	1.5
	1,3-Dichlorobenzene	0.26	-
	1,4-Dichlorobenzene	0.06	0.04
	1,2,3-Trichlorobenzene	0.003 [D]	0.03
	1,2,4- Trichlorobenzene	0.085 [D]	0.03
	Hexachlorobutadiene	-	0.0007
	Chlorobenzene	-	0.3

Notes to Table 11:

A: Investigation levels apply to typical slightly to moderately disturbed systems

B: Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2011)

C: Figure may not protect key species form chronic toxicity

D: Chemical for which possible bioaccumulation and secondary poisoning effects should be considered.

8.2.2 Health Screening Levels – Petroleum Hydrocarbons

The generic HSLs published in NEPC (2013) and CRC CARE (2011) are considered to be appropriate for the assessment of contamination in groundwater at the site. Given the proposed land use the adopted HSL are:

- **HSL B** – high density residential;
- **HSL C** – public open space;
- **HSL-D** – Commercial and Industrial; and
- **HSL** - Intrusive Maintenance Worker (shallow trench).

The inputs to the derivation of the HSL are given in Table 12.

Table 12: Inputs to the Derivation of HSLs

Variable	Input	Rationale
Potential exposure pathway	Vapour intrusion (inhalation) with contaminated groundwater as the source	The basement level is expected to intercept groundwater, which may be perched.
Soil Type	Sand	The intrusive investigations on site, as shown in the logs, show a subsurface comprised predominantly of sand
Depth to contamination	2 m to <4 m	Used as an initial screen. The detection of volatile contaminants in the groundwater may trigger a site specific risk assessment given the proposed basement depths.

The adopted groundwater HSL for vapour intrusion, from Table 1A(4), Schedule B1 of NEPC (2013) are shown in the following Table 13.

Table 13: Groundwater Health Screening Levels (HSL) for Vapour Intrusion (mg/L)

Analyte		HSL-B	HSL-C	HSL-D	HSL – Intrusive Maintenance Worker
TRH	$C_6 – C_{10}$ (less BTEX) [F1]	1	NL	6	NL
	$>C_{10}-C_{16}$ (less Naphthalene) [F2]	1	NL	NL	NL
BTEX	Benzene	0.8	NL	5	NL
	Toluene	NL	NL	NL	NL
	Ethylbenzene	NL	NL	NL	NL
	Xylene	NL	NL	NL	NL
PAH	Naphthalene	NL	NL	NL	NL

Note: *NL – Not limiting.*

8.3 Waste Classification Criteria

The waste classification was conducted with reference to the NSW Environment Protection Authority (EPA) *Waste Classification Guidelines* November 2014 (EPA, 2014).

9. Field Work Results

9.1 Soil

The subsurface profile encountered in DP (2018) and the current investigation have been summarised below.

- **PAVEMENT/SLAB**: A 30 – 70 mm thick asphaltic concrete surfacing overlying roadbase gravel to depths of between 0.2 m and 0.4 m was encountered in BH1 to BH6, BH8 and BH9. In the current investigation, brick pavement was encountered in BH201, and concrete pavers/slab was observed in BH202, BH204, BH205, BH208, BH212, BH214 and TP3 to depths of up to 0.1 m;
- **FILLING:** (topsoil): dark brown, fine to medium slightly silty sand topsoil was encountered in BH101, BH113, BH121, BH207, BH209, TP1- TP3 and TP7 to depths of between 0.05 m and 0.3 m;

  FILLING: Sandy filling with fine to medium gravel and trace of rootlets was encountered in BH101 to BH122 and TP1 to TP11, to depths of between 0.2 m and 1.4 m. Sandy filling and/or ripped sandstone was encountered in BH1 to BH9 to depths of between 0.2 m and 2.3 m. In the current investigation, sandy filling was observed in all boreholes at depths of up to 1.0 m. A trace of charcoal, clinker/slag was observed in BH201, BH213 and TP10, and anthropogenic material including brick, terracotta and glass fragments, metal sheeting, and asphaltic gravels were noted in BH201, BH202, BH205, BH207 to BH209, BH211, TP1, TP4, TP6, TP8 and TP9. Two distinct sandy fill layers were observed in BH201, BH202, BH207 to BH209, and BH215;
- **SAND**: In DP (2018), fine to medium dense yellow sand was encountered in all boreholes and test pits. Clayey sand was encountered in BH117 and BH118 at depths of 1.4 m and 1.0 m respectively. Dense clayey sand or possibly extremely low strength sandstone was encountered in BH6 below a depth of 5.2 m. A 0.5 m thick band of stiff silty clay/clay was encountered in BH9 below a depth of 5.5 m. In the current investigation, sand varying from grey/brown and yellow, fine to medium grained, was encountered in BH201 - BH207, BH209 – BH215 at depths of 0.35 to 4.7 m. A trace of charcoal was observed in BH211. Sandy silt/silty sand with a trace of charcoal was observed in BH207 and BH208 at depths of 0.9 m and 0.7 m, respectively, to borehole termination;
- **BEDROCK**: In boreholes BH1 to BH9, the top of bedrock ranged between depths of 1.5 m (RL 53.1 m) and 6.9 m (RL 40.7 m). The upper rock profile included variably extremely low to low strength sandstone. More consistent medium and high strength sandstone was encountered in all boreholes at depths ranging between 3.9 m (RL 44.6 m) and 8.8 m (RL 38.8 m). Some very low and low strength siltstone and laminite bands were interbedded within the sandstone in BH1, BH2, BH5, BH6, BH8 and BH9. The rock discontinuities were predominantly along bedding planes dipping between 0° and 20° below the horizontal with the occasional rock joint dipping between 30° and 70°. In the current investigation, very low to low strength sandstone was encountered in BH202 and BH204 at depths of 3.0 m and 4.7 m, respectively, to borehole termination.

Field Observations:

- Individual suspected asbestos containing material (ACM) fragments were located in BH106 at a depth of 0.0 – 0.2 m and TP10 at a depth of 0.0 - 0.1 m. Additionally, large sheets of suspected ACM were uncovered in TP9 at a depth of 0.4 - 0.5 m. The recovered potential ACM fragments and additional 500ml soil samples from each of the locations were sent to the laboratory for

analysis for ACM and Asbestos Fines (AF) and Fibrous Asbestos (FA). Chrysotile asbestos was confirmed in laboratory testing to be present in the material collected from BH106, whilst chrysotile, amosite and crocidolite were detected in the fragments collected from TP9 and TP10;

- All PID readings were <3 ppm; and
- Refusal was met at BH 120 due to limited access to soil.

9.2 Groundwater

The results of the groundwater level measurements recorded during drilling, well development and sampling is presented in Table 14. In certain bores, the use of water for rotary/washbore drilling and rock coring purposes precluded any further observation of groundwater.

No phase separated hydrocarbons (PSH) were observed or detected by the interface meter during well development or sampling.

Table 14: Summary of Groundwater Level Measurements

Borehole	During Drilling	During Well Development		During Sampling	
	Depth (m)	Date Purged	Depth (pre-purge) (m)	Date Sampled	Depth (post-sample) (m)
DP (2018)					
BH6	5.0	N/A	N/A	N/A	N/A
BH7	N/A	6 October 2017	5.1	-	-
Current Investigation					
BH202	3 m	29 June 2018	2.40	6 July 2018	3.56
BH204	N/A	29 June 2018	5.04	6 July 2018	5.96
BH11	N/A	N/A	N/A	6 July 2018	5.24
BH14	N/A	N/A	N/A	6 July 2018	3.56
BH16	N/A	N/A	N/A	6 July 2018	4.27
BH17	N/A	N/A	N/A	6 July 2018	4.21

10. Laboratory Summary Results

10.1 Soil

The analytical results for the soil samples collected during the DP (2018) and the current investigation are summarised in Table B1, together with the adopted SAC. Laboratory certificates of analysis are provided in Appendix E.

10.1.1 DP (2018) - Soil Laboratory Results

Concentrations of BTEX, phenols, OCP, OPP, PCB and light fraction TPH were below laboratory limits of reporting (LOR) for all soil samples. Metal concentrations were either less than the LOR and/or less than the adopted SAC with the exception of:

- Nickel in BH3/0.1-0.2 (79 mg/kg) and BH110/0-0.2 (26 mg/kg) which exceeded the EIL for commercial industrial (10mg/kg) and residential/open space (9 mg/kg);
- Copper in BH102/0-0.3 m (83 mg/kg) and BH112/0-0.2 (110 mg/kg) which exceeded the EIL for commercial industrial (80mg/kg) and residential/open space (65 mg/kg); and
- Zinc in BH104/0-0.3 (250 mg/kg), BH105/ 0.5-0.7 (310 mg/kg), BH111/0-0.2 (390 mg/kg), BH115/0.5-0.7 (310 mg/kg) and BH118/0.5-0.6 (510 mg/kg) which exceeded the EIL for residential/open space (240 mg/kg) and/or commercial / industrial (300 mg/kg).

A number of exceedances of ESL were noted for B(a)P in samples BH102/0-0,3, BH103/0-0.3, BH105/0.3-0.5, BH105/0.5-0.7, BH106/0-0.2, BH106/0.5-0.7, BH107/0-0.2, BH108/0-0.2, BH109/0-0.2, BH110/0-0.2, BH111/0-0.2, BH113/0.5-0.7, BH114/0.5-0.7, BH115/0.5-0.7, BH116/0-0.2.

There was also an exceedance of BaP TEQ in sample BH111 (8.197 mg/kg) which exceeded the HIL B (4 mg/kg) and HIL C (3 mg/kg).

Exceedances were noted for various contaminants in the roadbase sample taken from BH4/0.07-0.15 (noted as having a strong hydrocarbon odour) and BH8/0.4-0.5. Exceedances included:

- Copper – 100 mg/kg in BH4 exceeded EILs for commercial / industrial (80 mg/kg) and residential/open space (65 mg/kg);
- TRH C10-C16 – 1700 mg/kg in BH8 exceeded management limits (1000 mg/kg);
- TRH C16-C34 – 6600 mg/kg in BH4 and 11,000 mg/kg in BH8 exceeded ESLs for urban residential (300 mg/kg) and industrial / commercial (1700 mg/kg) and management limits (10000 mg/kg);
- TRH F2-naphthalene – 170 mg/kg in BH4 and 1600 mg/kg in BH8 exceeded NEPM (2013) Table 1A(3) Res A/B Soil HSL for vapour intrusion, Sand (0-1m) (110 mg/kg) and NEPM (2013) Table 1B(6) ESLs for Urban Res, Coarse Soil (120 mg/kg);
- Benzo(a)pyrene – 57 mg/kg in BH4 exceeded ESLs for urban residential (0.7 mg/kg) and industrial / commercial (1.4 mg/kg);
- Total PAH – 740 mg/kg in BH4 exceeded the HIL B (400 mg/kg) and HIL C (300 mg/kg); and

- Carcinogenic PAH – 77 mg/kg in BH4 exceeded HIL B (4 mg/kg), HIL C (3 mg/kg) and HIL D (40 mg/kg), Naphthalene of 150 mg/kg in BH8 exceeded the HSL A & B – vapour intrusion (3 mg/kg).

The fragment of fibreboard discovered during hand-augering in BH106 was analysed and Chrysotile asbestos was confirmed in laboratory testing to be present in this material.

10.1.2 Current Investigation – Soil Laboratory Results

Concentrations of TRH, BTEX, Phenol, OCP, and OPP in all soil samples were either below the LOR and/or SAC. Concentrations of metals were below the SAC, with the exception of the following exceedances:

- Copper – 85 mg/kg in BH208 exceeded the EIL for residential/open space (65 mg/kg) and commercial / industrial (80 mg/kg); and
- Zinc – 300 mg/kg in BH213 exceeded the EIL for residential/open space (240 mg/kg); and
- Lead in TP9/0-0.1 (890 mg/kg) which exceeded the HIL for residential (600 mg/kg).

Concentrations of PAH were below the SAC in all soil samples with the exception of the following exceedances:

- BaP at BH201 (0.83mg/kg), BH202 (0.8 mg/kg), BH205 (1.3 mg/kg), BH206 (1.7 mg/kg), BH207 (1.2 mg/kg), BH208 (2.9 mg/kg), BH209 (1.4 mg/kg), BH210 (1.5 mg/kg),BH215 (3.2 mg/kg) and TP9/0-0.1 (1.2 mg/kg) which exceeded the ESL for urban residential (0.7 mg/kg);
- BaP at TP4/0.4-0.5 (1.5 mg/kg) which exceeded the ESL for commercial/ industrial (1.4 mg/kg); and
- BaP TEQ at BH208 (4.3 mg/kg) and BH215 (4.5 mg/kg) which exceeded the exceeded HIL B (4 mg/kg) and HILC (3 mg/kg).

Concentrations of PCB were below the SAC in all soil samples with the exception of BH206 (1.6 mg/kg) which exceeded the HIL B (1 mg/kg) and HIL C (1 mg/kg).

The fragments of fibreboard discovered during test pitting in TP9 and TP10 were analysed and chrysotile, amosite and crocidolite asbestos were confirmed in laboratory testing to be present in this material.

10.2 Groundwater (DP 2018 and Current Investigation)

The analytical results for the groundwater samples collected during the DP (2018) and the current investigation are summarised in Table B2, together with the adopted SAC. Laboratory certificates of analysis are provided in Appendix E.

No PSH was observed or detected by the interface meter during well development or sampling. Concentrations of all contaminants were either below the detection limit or the SAC, with the exception of the following:

- Copper in samples GW7 and the duplicate (0.007 mg/L), BH202 (0.002 mg/L), BH204 (0.008 mg/L), BH11 (0.005 mg/L), BH14 (0.007 mg/L), and BH17 (0.003 mg/L) which exceeded the GIL of 0.0014 mg/L; and
- Zinc in sample GW7 (0.022 mg/L) and the duplicate (0.024mg/L), BH202 (0.031 mg/L), BH204 (0.028 mg/L), BH11 (0.013 mg/L), BH14 (0.055 mg/L) and BD1 (0.026 mg/kg) which exceeded the GIL of 0.008 mg/L.

These results are however considered to be typical of groundwater conditions in urban settings. DP notes that the detection limit for BaP and a few of the VOCs were higher than the assessment criteria.

10.3 Preliminary Waste Classification

The preliminary waste classification results are presented in Table B3, Appendix B.

DP (2018)

As shown in Table B3, concentrations for the analysed samples were within the contaminant thresholds for General Solid Waste (GSW) without TCLP, with the exception of the PAH (benzo(a)pryene) concentrations in the following samples:

Sample ID	Sample Depth	Matrix Description
BH4	0.07-0.15	Roadbase
BH103	0-0.3	Fill
BH103	0.5-0.7	Natural Sand
BH105	0.3-0.5	Fill
BH106	0-0.2	Fill
BH107	0-0.2	Fill
BH108	0-0.2	Fill
BH110	0.5-0.7	Natural sand
BH111	0-0.2	Fill
BH113	0.5-0.7	Natural sand
BH114	0.5-0.7	Fill
BH115	0.5-0.7	Natural sand
BH116	0.0-0.2	Fill

Lead concentrations in the following samples exceeded the CT1 criteria:

Sample ID	Sample Depth	Matrix Description
BH103	0-0.3	Fill
BH105	0.3-0.5	Fill
BH105	0.5-0.7	Natural Sand
BH106	0-0.2	Fill
BH106	0.5-0.7	Natural Sand
BH108	0-0.2	Fill
BH108	0.7-0.8	Natural Sand
BH109	0-0.2	Fill
BH110	0-0.2	Fill
BH110	0.5-0.7	Natural Sand
BH111	0-0.2	Fill
BH112	0-0.2	Natural Sand
BH113	0.5-0.7	Natural Sand
BH114	0.5-0.7	Fill
BH115	0.5-0.7	Natural Sand
BH116	0-0.2	Fill
BH117	1.5-1.6	Natural Sand
BH118	0.5-0.6	Fill
BH119	0.5-0.6	Fill
BH121	0-0.5	Fill

Note that the natural sand samples listed above may actually be fill or may have been impacted through the sampling phase and the overlying fill.

In addition, the following exceedances were also noted:

- Nickel in BH3/0.1-0.2 at 79 mg/kg, which exceeded CT1 of 40 mg/kg;
- Total PAH in BH4/0.07-0.15 at 634.3 mg/kg, which exceeded SCC1 of 200 mg/kg; and
- TPH (C10-36) in BH8/0.4-0.5 at 13160 mg/kg exceeded SCC1 of 10,000 mg/kg.

A selected range of samples were subjected to analysis under TCLP to determine leachable concentrations. The TCLP results indicated that all samples recorded leachable concentrations within GSW leaching criteria (TCLP1) for lead and B(a)P where tested.

Based on the results, the filling encountered in the bores at the site is preliminarily classified for off-site disposal purposes as General Solid Waste (non-putrescible), with the exception of the following areas:

- Roadbase across the site which will require further testing and classification;
- Fill in the vicinity of BH3/0.1-0.2 where nickel exceedances necessitate further TCLP testing; and
- Fill in the vicinity of BH 106 where fragments were confirmed to be ACM (chrysotile asbestos).

Current Investigation

As shown in Table B3 concentrations for the analysed samples were within the contaminants thresholds (CT1) for GSW, with the exception of the following exceedances for lead / and or B(a)P.

Sample ID	Sample Depth	Matrix Description	Analyte
BH201	0.2-0.3	Fill	Pb and B(a)P
BH202	0.3-0.4	Fill	Pb
BH205	0.1-0.2	Fill	B(a)P
BH206	0.3-0.4	Fill	Pb and B(a)P
BH207	0.1-0.2	Fill	B(a)P
BH208	0.3-0.4	Fill	Pb and B(a)P
BH209	0.1-0.2	Fill	Pb and B(a)P
BH209	0.3-0.4	Fill	Pb
BH210	0.2-0.3	Fill	Pb and B(a)P
BH211	0.1-0.2	Fill	Pb
BH211	0.4-0.5	Fill	Pb
BH213	0.1-0.2	Fill	Pb
BH213	0.3-0.4	Fill	Pb
BH215	0.1-0.2	Fill	Pb and B(a)P
TP4	0.4-0.5	Fill	Pb and B(a)P
TP5	0.1-0.2	Fill	Pb
TP9	0-0.1	Fill	B(a)P
TP10	0.4-0.5	Fill	Pb
TP11	0-0.1	Fill	Pb

Additionally, the lead concentration from the sample from TP9/0-0.1 (890 mg/kg) exceeded the contaminant threshold (CT2) for Restricted Solid Waste (RSW) (400 mg/kg).

A selected range of samples from the boreholes and test pits were subjected to analysis under TCLP to determine leachable concentrations. The TCLP results from the boreholes samples indicated that all the borehole samples recorded leachable concentrations within GSW leaching criteria (TCLP1) for lead and B(a)P, where tested. The TCLP results from the test pit samples will be issued once they have been received. It should also be noted that not all samples with recorded exceedances were subject to TCLP testing. However, the results of TCLP from the borehole samples tested were applied to other borehole samples.

DP notes that substantial excavation of the site is required to achieve the required levels for the proposed development, such that a minimum of 0.5 m and a maximum of 8 m excavation will be undertaken across the site. As such, the majority of fill identified at the site will be removed as part of the proposed works.

11. Discussion

Based on the site history provided in DP (2018) and the field and laboratory results reported herein, it is considered that the site in general has a low potential for contamination with respect to the proposed hospital development.

The soil results indicated several exceedances of health and ecological criteria (predominantly ecological), which warrant further investigation, management and / or remediation. With regards to groundwater, DP does not consider any further investigation to be necessary.

12. Conclusions and Recommendations

Based on the results of the current investigation, and together with the findings of DP (2018), DP recommends the following:

- Pre-demolition hazardous building materials survey of the building structures which comprise the site. It is noted that many of the premises appear to contain some asbestos and other hazardous materials;
- Preparation of a remediation action plan (RAP) to address the low level soil contamination identified in this report, outline additional investigation requirements, and present an unexpected finds protocol;
- Post demolition clearance for surface asbestos containing materials (ACM) by an experienced occupational hygienist;
- Post demolition sampling and testing of soils in existing building footprints;
- Additional delineation sampling in the areas where exceedances were observed to determine the extent of contamination; and
- Remediation of impacted soils under the RAP.

It is further recommended that the post-demolition investigations be undertaken using test pits rather than bores to enable a more thorough visual assessment of the potential for the existence and spread of asbestos impact in the soils.

Overall, DP considers the site could be made suitable for the proposed development, subject to the recommendations outlined above.

In terms of off-site disposal of surplus soils, or soils required to be removed as part of the remediation process, testing to date suggests that the fill across the site is likely to predominantly classify as general solid waste (non-putrescible), subject to further confirmation and the absence of any cross contamination. The final waste classification must be confirmed post-demolition to assess any impacts of the demolition process. Natural soils are likely to classify as virgin excavated natural material (VENM) in general, subject to further confirmation as above, particularly in the locations where natural soils had elevated PAH and lead concentrations (Tables under Section 10.3).

13. Limitations

Douglas Partners (DP) has prepared this report for this project at the site bound by Hospital Road, High Street, Botany Street and Magill Street in accordance with DP's initial proposal SYD180227 dated 4 June 2018, and subsequent proposals for variations to the work. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Lend Lease Building Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

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 / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Appendix A

About This Report

Drawing

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

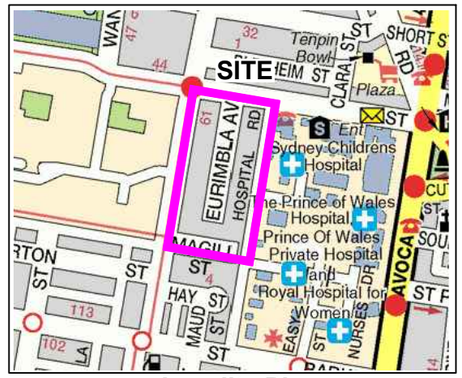
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later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



Locality Plan

LEGEND

- Previous borehole (UNSW Wallace Wurth Building, Proj. 71543, 2010)
- Previous borehole (UNSW Bioscience Building Proj. 73492, 2013)
- Previous borehole (Prince of Wales Hospital Proj. 85461.00, 2016)
- DP borehole location (Oct. 2017)
- DP Environmental borehole (Jan. 2018)
- W Groundwater monitoring well
- Photo number with direction of view
- Existing groundwater well
- DP borehole location (June, 2018)
- DP test pit location (Aug. 2018)

NOTE:
1: Base image from Nearmap.com (Dated 6.8.2017)
2: Test locations were located using high resolution hand held GPS.

0 5 10 20 30 40 50 75 100 125m
1:1250 @ A3

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Lend Lease Building		TITLE: **Test Locations of Previous and Current Boreholes**	PROJECT No: 72505.14
OFFICE: Sydney	DRAWN BY: PSCH	**Randwick Campus Redevelopment**	DRAWING No: 1
SCALE: 1:1250 @ A3	DATE: 16.8.2018	**Hospital Road and High, Magill and Botany Streets, RANDWICK**	REVISION: 1

Appendix B

Summary of Laboratory Results

Douglas Partners
Geotechnics / Environment / Groundwater

Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
DP (August 2018)																																				
TP1	0.3-0.4	7/08/2018	Fill	-	-	-	-	47	-	-	-	<0.1	0.1	<0.5	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP1	1.1-1.2	7/08/2018	Natural Sand	-	-	-	-	1	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP2	0-0.1	7/08/2018	Fill	-	-	-	-	91	-	-	-	<0.1	0.1	<0.5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP2	1.3-1.4	7/08/2018	Natural Sand	-	-	-	-	<1	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP3	0.1-0.2	7/08/2018	Fill	-	-	-	-	22	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP3	1.0-1.1	7/08/2018	Natural Sand	-	-	-	-	<1	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP4	0.4-0.5	7/08/2018	Fill	-	-	-	-	180	-	-	-	<0.1	1.5	2.1	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD2/20180807	-	7/08/2018	Fill	-	-	-	-	220	-	-	-	<0.1	0.4	0.6	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP4	0.6-0.7	7/08/2018	Natural Sand	-	-	-	-	<1	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP5	0.1-0.2	7/08/2018	Fill	-	-	-	-	140	-	-	-	<0.1	0.63	0.9	5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP5	0.9-1.0	7/08/2018	Natural Sand	-	-	-	-	14	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP6	0.4-0.5	8/08/2018	Fill	<4	<0.4	2	13	91	0.1	<1	27	<0.1	0.2	<0.5	2.1	<5	<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BD1/20180808	-	8/08/2018	Fill	<4	<0.4	1	12	55	0.1	<1	24	<0.1	<0.05	<0.5	<0.05	-	<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-
TP6	1.4-1.5	8/08/2018	Natural Sand	<4	<0.4	2	<1	2	<0.1	<1	11	<0.1	<0.05	<0.5	<0.05	-	<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-
TP7	0.3-0.4	8/08/2018	Fill	-	-	-	-	20	-	-	-	<0.1	0.1	<0.5	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Geotechnics / Environment / Groundwater

Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
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ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
TP7	0.7-0.8	8/08/2018	Natural Sand	-	-	-	-	<1	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP8	0.5-0.6	8/08/2018	Fill	<4	<0.4	<1	4	19	0.4	<1	26	<0.1	<0.05	<0.5	<0.05	<5	<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
TP8	1.3-1.4	8/08/2018	Natural Sand	<4	<0.4	2	<1	2	<0.1	<1	22	<0.1	<0.05	<0.5	<0.05		<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	-
TP9	0-0.1	8/08/2018	Fill	<4	<0.4	8	37	890	0.2	4	200	<0.1	1.2	1.7	10	<5	<50	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	1.7	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
TP9	0.4-0.5	8/08/2018	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
TP9	0.4-0.5A	8/08/2018	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Chrysotile, Amosite & Crocidolite detected**
TP10	0.4-0.5	8/08/2018	Fill	-	-	-	-	110	-	-	-	<0.1	0.3	0.5	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10	0.9-1.0	8/08/2018	Natural Sand	-	-	-	-	2	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10	0-0.1	8/08/2018	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
TP10	0-0.1A	8/08/2018	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**Chrysotile, Amosite & Crocidolite detected**
TP11	0-0.1	8/08/2018	Fill	-	-	-	-	180	-	-	-	<0.1	0.2	<0.5	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP11	0.4-0.5	8/08/2018	Natural Sand	-	-	-	-	3	-	-	-	<0.1	<0.05	<0.5	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DP (June, 2018)																																				
BH201	0.2-0.3	26/06/2018	Fill	<4	<0.4	4	17	130	<0.1	3	88	<0.1	0.83	1.3	6.9	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD

Douglas Partners
Geotechnics / Environment / Groundwater

Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
BH202	0.3-0.4	26/06/2018	Fill	<4	<0.4	3	12	110	<0.1	2	81	<0.1	0.8	1.1	7	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH202	0.9-1.0	26/06/2018	Fill	<4	<0.4	<1	4	16	<0.1	<1	51	<0.1	<0.05	<0.5	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	NAD
BH204	0.3-0.4	27/06/2018	Fill	<4	<0.4	2	7	30	<0.1	1	26	<0.1	0.2	<0.5	1.6	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	NAD
BH205	0.1-0.2	25/06/2018	Fill	<4	<0.4	3	11	67	<0.1	2	52	<0.1	1.3	2	10	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH206	0.3-0.4	25/06/2018	Fill	<4	<0.4	4	13	140	0.1	2	49	<0.1	1.7	2.5	16	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	NAD
BH207	0.1-0.2	25/06/2018	Fill	<4	<0.4	4	12	98	<0.1	2	93	<0.1	1.2	1.7	17	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH208	0.3-0.4	25/06/2018	Fill	7	0.6	7	85	270	0.2	3	160	0.1	2.9	4.3	31	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	0.6	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NAD
BH209	0.1-0.2	26/06/2018	Fill	<4	0.5	9	32	350	0.1	4	130	<0.1	1.4	2	13	-	<25	<50	120	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	NAD
BH209	0.3-0.4	26/06/2018	Fill	<4	<0.4	5	19	180	<0.1	2	84	<0.1	0.57	0.8	5.4	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	NAD
BH210	0.2-0.3	26/06/2018	Fill	<4	1	5	35	130	0.1	3	150	<0.1	1.5	2.2	16	<5	<25	<50	160	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NAD
BH211	0.1-0.2	26/06/2018	Fill	<4	0.4	8	29	130	0.2	5	160	<0.1	0.2	<0.5	2.4	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH211	0.4-0.5	26/06/2018	Fill	<4	<0.4	5	20	130	0.3	3	140	<0.1	0.3	<0.5	3.1	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	NAD
BH212	0.4-0.5	26/06/2018	Fill	<4	<0.4	2	1	4	<0.1	1	9	<0.1	<0.05	<0.5	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH213	0.1-0.2	26/06/2018	Fill	<4	<0.4	4	25	150	0.2	2	300	<0.1	0.3	<0.5	3.7	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	-	-	-	-	-	-	-	-	-	-	NAD
BH213	0.3-0.4	26/06/2018	Fill	<4	<0.4	4	23	130	0.1	3	170	<0.1	0.2	<0.5	2.2	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH214	0.1-0.2	26/06/2018	Fill	<4	<0.4	3	4	29	<0.1	1	15	<0.1	0.07	<0.5	0.2	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD

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Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370														600	10	90	400	20	10	15	500	340	1	
EIL (Res/Open Space)				100		200	65	1100		9	240	170														600	10	90	400	20	10	15	500	340	1	
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
BH215	0.1-0.2	29/06/2018	Fill	<4	<0.4	6	21	190	<0.1	4	56	0.1	3.2	4.5	28	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<3	0.2	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
DP (Oct 2017- Jan 2018)																																				
BH1	0.5-0.6	18/09/2017	Fill	<4	<0.4	2	4	25	<0.1	1	28	<0.1	0.06	0.121	0.3	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH2	0.3-0.4	18/09/2017	Fill	<4	<0.4	4	2	16	<0.1	2	37	<0.1	<0.05	<0.172	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH3	0.1-0.2	21/09/2017	Fill	<4	<0.4	46	63	7	<0.1	79	42	<0.1	<0.05	<0.172	0.1	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH3	0.7-0.8	21/09/2017	Fill	<4	<0.4	1	4	29	<0.1	1	24	<0.1	0.07	0.131	0.3	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH3	1.3-1.43	21/09/2017	Natural Sand	<4	<0.4	<1	3	6	<0.1	<1	3	<0.1	<0.05	<0.172	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH4	0.07-0.15	18/09/2017	Roadbase	<4	<0.4	<1	100	1	<0.1	3	10	<1 - 0.4	57	77	740	<5	<25	170	6600	<25	170	<0.2	<0.5	<1	<1	<1	<2	<2	<3	<1	<1	<1	<1	<1	<1	NAD
BH4	0.5-0.6	18/09/2017	Fill	<4	<0.4	3	2	10	<0.1	2	10	<0.1	0.52	0.647	4.5	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH5	0.4-0.5	19/09/2017	Fill	<4	<0.4	<1	<1	2	<0.1	<1	1	<0.1	<0.05	<0.172	0.2	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH5	0.9-1	19/09/2017	Natural Sand	<4	<0.4	<1	<1	<1	<0.1	<1	<1	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-
BH5	1.3-1.4	19/09/2017	Natural Sand	<4	<0.4	3	<1	2	<0.1	1	2	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-
BH7	0.1	6/10/2017	Fill	<4	<0.4	4	14	94	<0.1	2	72	<0.1	0.3	0.394	2.8	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	3	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH7	0.5	6/10/2017	Natural Sand	<4	<0.4	2	<1	6	<0.1	1	12	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	-
BH108	0.4-0.5	23/01/2018	Roadbase	<4	<0.4	5	29	12	<0.1	4	22	150	-	-	-	<5	<25	1700	11000	<25	1600	<0.2	<0.5	<1	<1	<1	<2	<2	<3	<1	<1	<1	<2	<1	<1	NAD
BH108	0.6-0.7	23/01/2018	Fill	<4	<0.4	1	1	<1	<0.1	<1	2	<1 - 0.1	0.2	0.293	3.6	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD

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Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
BH109	0.6-0.7	23/01/2018	Fill	<4	<0.4	<1	1	8	<0.1	<1	6	<0.1	<0.05	<0.172	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH109	1.4-1.5	23/01/2018	Fill	<4	<0.4	<1	<1	<1	<0.1	<1	<1	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH101	0.5-0.7	9/01/2018	Fill	<4	<0.4	4	5	34	0.1	<1	30	<0.1	0.1	0.1665	0.94	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH101	1.4-1.6	9/01/2018	Natural Sand	<4	<0.4	9	<1	4	<0.1	2	22	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH102	0.3	9/01/2018	Fill	<4	0.5	9	83	450	0.2	3	150	<0.1	1.2	1.59	12	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH103	0-0.3	9/01/2018	Fill	<4	<0.4	5	25	220	0.1	3	99	<0.1	1.2	1.59	11	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH103	0.5-0.7	9/01/2018	Natural Sand	<4	<0.4	3	14	20	<0.1	2	29	<0.1	0.63	0.759	4.8	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH104	0-0.3	9/01/2018	Fill	<4	0.5	4	24	110	0.1	2	250	<0.1	0.3	0.395	2.6	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH105	0.3-0.5	9/01/2018	Fill	<4	<0.4	4	16	130	<0.1	2	140	<0.1	0.77	0.993	7.2	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH105	0.5-0.7	9/01/2018	Natural Sand	<4	<0.4	3	10	130	<0.1	2	310	<0.1	1.1	1.387	12	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH106	0-0.2	9/01/2018	Fill	<4	0.7	5	32	180	0.1	3	230	<0.1	0.73	0.932	6.7	<5	<25	<50	130	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH106	0.5-0.7	9/01/2018	Natural Sand	<4	<0.4	4	16	90	<0.1	2	100	<0.1	0.91	1.144	7.1	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH107	0-0.2	9/01/2018	Fill	<4	<0.4	7	25	270	0.2	4	160	<0.1	1.8	2.278	16	<5	<25	<50	110	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NAD
BH108	0-0.2	9/01/2018	Fill	<4	0.5	6	26	280	0.2	4	200	<0.1	1.5	1.953	14	<5	<25	<50	100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH108	0.7-0.8	9/01/2018	Natural Sand	<4	<0.4	3	3	230	<0.1	2	96	<0.1	0.54	0.668	4.4	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH109	0-0.2	9/01/2018	Fill	<4	<0.4	8	28	240	<0.1	6	200	<0.1	0.78	1.012	7.3	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	NAD

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Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
BH110	0-0.2	9/01/2018	Fill	5	<0.4	26	43	77	0.1	26	210	<0.1	1.4	1.821	13	-	<25	<50	160	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH110	0.5-0.7	9/01/2018	Natural Sand	5	<0.4	6	12	53	0.2	2	170	<0.1	0.2	0.295	2.8	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH111	0-0.2	10/01/2018	Fill	7	0.8	18	50	470	0.2	5	390	<1 - 0.3	6.4	8.197	61	<5	<25	<50	480	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NAD
BH112	0-0.2	10/01/2018	Natural Sand	6	2	20	110	440	0.2	5	230	<0.1	0.5	0.628	4.2	<5	<25	<50	110	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	NAD
BH112	0.6-0.7	10/01/2018	Fill	<4	<0.4	1	4	8	<0.1	<1	58	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH113	0.1-0.3	10/01/2018	Fill	<4	<0.4	2	7	28	<0.1	<1	31	<0.1	0.2	0.284	2.1	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH113	0.5-0.7	10/01/2018	Natural Sand	<4	<0.4	14	37	350	0.1	4	130	<0.1	1.2	1.588	11	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH114	0.5-0.7	10/01/2018	Fill	<4	<0.4	5	19	130	0.1	2	38	<0.1	1.1	1.478	11	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH115	0-0.2	10/01/2018	Fill	<4	<0.4	2	4	10	<0.1	1	53	<0.1	0.09	0.151	0.4	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH115	0.5-0.7	10/01/2018	Natural Sand	<4	<0.4	9	30	360	0.2	4	310	<0.1	0.89	1.124	7.9	-	<25	<50	100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH116	0-0.2	10/01/2018	Fill	<4	<0.4	7	26	360	0.2	4	160	<0.1	1.4	1.851	16	<5	<25	<50	110	<25	<50	<0.2	<0.5	<1	<1	0.1	2.05	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH117	0.6-0.8	10/01/2018	Fill	<4	<0.4	11	<1	6	<0.1	2	220	<0.1	<0.05	<0.172	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH117	1.5-1.6	10/01/2018	Natural Sand	<4	<0.4	4	14	270	0.3	2	220	<0.1	0.52	0.657	5.3	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH118	0.5-0.6	10/01/2018	Fill	<4	0.8	9	43	350	0.2	3	510	<0.1	0.6	0.739	5.5	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH119	0.5-0.6	10/01/2018	Fill	<4	<0.4	6	12	100	<0.1	3	72	<0.1	0.3	0.395	2.5	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH119	1-1.1	10/01/2018	Natural Sand	<4	<0.4	2	4	13	<0.1	1	12	<0.1	<0.05	<0.172	<0.05	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD

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Table B1 - Summary of Soil Laboratory Analysis (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth	Sampling Date	Soil Type*	Metals								PAH				Phenols	Total Recoverable Hydrocarbons					BTEX				Organochlorine Pesticides (OCP)								OPP	PCB	Asbestos
				Arsenic	Cadmium	Chromium (VI)[b]	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	Benzo(a) Pyrene (BaP)	BaP TEQ	Total PAH	Phenol	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	C16 -C34	C6 - C10 less BTEX (F1)	F2 - Napthalene	Benzene	Toluene	Ethylbenzene	Total xylenes	DDT + DDD + DDE	Aldrin and Dieldrin	Chlordane	Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor	Chlorpyrifos	PCB	Asbestos (% w/w)
	Practical Quantitation Limit (PQL)			4	0.4	1	1	1	0.1	1	1	0.1	0.05	0.5	0.05	5	25	50	100	25	50	0.2	0.5	1	3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.7	
Site Assessment Criteria (SAC)																																				
EIL (Comm/Ind)				160		320	80	1800		10	300	370																								
EIL (Res/Open Space)				100		200	65	1100		9	240	170																								
HILs (Res B)				500	150		30000	1200	120	1200	60000			4	400	130										600	10	90	400	20	10	15	500	340	1	
HILs (Res C)				300	90		17000	600	80	1200	30000			3	300	120										400	10	70	340	20	10	10	400	250	1	
HILs (Comm/nd D)				3000	900		240000	1500	730	6000	400000			40	4000	660										3600	45	530	2000	100	50	80	2500	2000	7	
HSL A&B - vapour intrusion (Sand)												3								45	110	0.5	160	55	40											
HSL C - vapour intrusion (Sand)												NL								NL	NL	NL	NL	NL	NL											
HSL D vapour intrusion (Sand)												NL								260	NL	3	NL	NL	230											
ESL (Urrban Res)													0.7						300	180	120	50	85	70	105											
ESL (Comm/Ind), Coarse													1.4						1700	215	170	75	135	165	180											
Management Limits (Res, Parkland)																	700	1000	2500																	
Management Limits (comm/Ind)																	700	1000	3500																	
BH120	0-0.1	10/01/2018	Fill	13	<0.4	13	35	21	0.2	4	85	<0.1	0.07	0.131	0.3	<5	<25	<50	210	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD
BH121	0-0.05	10/01/2018	Fill	4	<0.4	9	31	290	<0.1	4	160	<0.1	0.2	0.294	2.2	8	<25	63	520	<25	63	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NAD
BH122	0-0.1	10/01/2018	Fill	<4	<0.4	6	9	69	<0.1	1	31	<0.1	0.1	0.161	0.63	-	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	-	-	-	-	-	-	-	-	-	-	NAD
BH122	0.5-0.6	10/01/2018	Natural Sand	<4	<0.4	3	3	15	<0.1	1	7	<0.1	<0.05	<0.172	<0.05	<5	<25	<50	<100	<25	<50	<0.2	<0.5	<1	<1	<0.1	<0.2	<0.2	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NAD

		Metals								TRH		MAH						VOCs															PAH	Phenols
		Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)	F2-NAPHTHALENE	C6-C10 less BTEX (F1)	Benzene	Ethylbenzene	Toluene	Xylene (m&p)	Xylene (o)	Styrene	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	Carbon tetrachloride	Chloroform	Hexachlorobutadiene	Tetrachloroethene	Vinyl chloride	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Benzo(a) pyrene	Naphthalene	Phenol
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL		0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.05	0.01	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.001	0.001	0.001	0.001	0.001	0.001	0.0001	0.0002	0.05
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand																																		
2-4m										1	1	0.8	NL	NL																			NL	
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand																																		
2-4m										NL	NL	NL	NL	NL																			NL	
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																																		
2-4m										NL	6	5	NL	NL																			NL	
NEPM 2013 Table 1C GILs, Fresh Waters		0.024	0.0002	0.001	0.0014	0.0034	0.00006	0.011	0.008	-	-	0.95	-	-	0.2	0.35	-	6.5	-	-	-	-		-	-	0.003	0.085	0.16	0.26	0.06	-	-	0.016	0.32
NEPM 2013 Table 1C GILs, Drinking Water		0.01	0.002	0.05	2	0.01	0.001	0.02	-	-	-	0.001	0.3	0.8	0.6	0.6	0.03	-	0.03	0.003	0.003	0.003	0.0007	0.05	0.0003	0.03	0.03	1.5	-	0.04	0.3	0.00001	-	-
Field ID	**Sampled Date**																																	
Current Investigation																																		
BH202		<0.001	0.0001	<0.001	0.002	<0.001	<0.00005	0.005	0.031	<0.05	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BH204		<0.001	<0.0001	<0.001	0.008	<0.001	<0.00005	0.002	0.028	<0.05	0.039	<0.001	0.001	<0.001	0.009	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BH11		<0.001	<0.0001	<0.001	0.005	<0.001	<0.00005	<0.001	0.013	<0.05	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BH14		<0.001	0.0001	<0.001	0.007	<0.001	<0.00005	<0.001	0.055	<0.05	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BH16		<0.001	<0.0001	<0.001	0.012	<0.001	<0.00005	0.001	0.007	<0.05	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BH17		<0.001	<0.0001	<0.001	0.003	<0.001	<0.00005	<0.001	0.008	0.074	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
BD1/20180706		<0.001	0.0001	<0.001	0.001	<0.001	<0.00005	0.004	0.026	<0.05	<0.01	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
DP (2018)																																		
BD13102017	13/10/2017	<0.001	<0.0001	<0.001	0.007	<0.001	<0.00005	0.002	0.022	<0.05	0.012	<0.001	<0.001	0.001	<0.002	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0002	<0.05
GW7	13/10/2017	<0.001	<0.0001	<0.001	0.007	<0.001	<0.00005	0.002	0.024	<0.05	0.013	<0.001	<0.001	0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0002	<0.05

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Table B3 - Waste Classification Table (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID*	Sampling Depth	Soil Type	Metals							PAH			Phenols	Total Petroleum Hydrocarbons								OCP	OPP	PCB	Asbestos
			Arsenic	Cadmium	Chromium (VI)^	Lead	Lead (TCLP)	Mercury	Nickel	Benzo(a) Pyrene (BaP)	BaP (TCLP)	Total PAH	Phenol	C6 - C9	C10 - C14	C15-C28	C28 - C36	Benzene	Toluene	Ethylbenzene	Xylenes	Endosulfan	Chlorpyrifos	PCB *	Asbestos
PQL			4	0.4	1	1		0.1	1	0.05	0.04	0.05	5	25	50	100	100	0.2	0.5	1	3	0.3	0.1	0.7	0.1g /kg
Site Assessment Criteria (SAC)																									
NSW EPA (2014) CT1 (mg/kg) General Solid Waste			100	20	100	100	-	4	40	0.8	-	200	288	650	10 000			10	288	600	1000	60	4	<50	NAD
NSW EPA (2014) SCC1 with TCLP			500	100	1900	1500	5	50	1050	10	0.04	200	518	650	10 000			18	518	1080	1800	108		<50	NAD
NSW EPA (2014) CT2 (mg/kg) Restricted Solid Waste			400	80	400	400	-	16	160	3.2	-	800	1152	2600	40 000			40	1152	2400	4000	240	16	<50	NAD
NSW EPA (2014) Restricted Solid Waste with TCLP			2000	400	7600	6000	20	200	4200	23	0.16	800	2073	2600	40 000			72	2073	4320	7200	432	30	<50	NAD
DP (August 2018)																									
TP1	0.3-0.4	Fill	-	-	-	47	-	-	-	0.1	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
TP1	1.1-1.2	Natural Sand	-	-	-	1	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP2	0-0.1	Fill	-	-	-	91	-	-	-	0.1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
TP2	1.3-1.4	Natural Sand	-	-	-	<1	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP3	0.1-0.2	Fill	-	-	-	22	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP3	1.0-1.1	Natural Sand	-	-	-	<1	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP4	0.4-0.5	Fill	-	-	-	180	-	-	-	1.5	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-
BD2/20180807	-	Fill	-	-	-	220	-	-	-	0.4	-	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-
TP4	0.6-0.7	Natural Sand	-	-	-	<1	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP5	0.1-0.2	Fill	-	-	-	140	-	-	-	0.63	-	5.6	-	-	-	-	-	-	-	-	-	-	-	-	-
TP5	0.9-1.0	Natural Sand	-	-	-	14	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP6	0.4-0.5	Fill	<4	<0.4	2	91	-	0.1	<1	0.2	-	2.1	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BD1/20180808	-	Fill	<4	<0.4	1	55	-	0.1	<1	<0.05	-	<0.05	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	-
TP6	1.4-1.5	Natural Sand	<4	<0.4	2	2	-	<0.1	<1	<0.05	-	<0.05	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	-
TP7	0.3-0.4	Fill	-	-	-	20	-	-	-	0.1	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-
TP7	0.7-0.8	Natural Sand	-	-	-	<1	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP8	0.5-0.6	Fill	<4	<0.4	<1	19	-	0.4	<1	<0.05	-	<0.05	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
TP8	1.3-1.4	Natural Sand	<4	<0.4	2	2	-	<0.1	<1	<0.05	-	<0.05	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	-
TP9	0-0.1	Fill	<4	<0.4	8	890	-	0.2	4	1.2	-	10	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
TP9	0.4-0.5	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
TP9	0.4-0.5A	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Chrysotile, Amosite & Crocidolite detected
TP10	0.4-0.5	Fill	-	-	-	110	-	-	-	0.3	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10	0.9-1.0	Natural Sand	-	-	-	2	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10	0-0.1	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001
TP10	0-0.1A	Material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Chrysotile, Amosite & Crocidolite detected
TP11	0-0.1	Fill	-	-	-	180	-	-	-	0.2	-	2.2	-	-	-	-	-	-	-	-	-	-	-	-	-
TP11	0.4-0.5	Natural Sand	-	-	-	3	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
DP (June, 2018)																									
BH201	0.2-0.3	Fill	<4	<0.4	4	130	0.1	<0.1	3	0.83	<0.001	6.9	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH202	0.3-0.4	Fill	<4	<0.4	3	110	0.1	<0.1	2	0.8	-	7	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH202	0.9-1.0	Fill	<4	<0.4	<1	16	-	<0.1	<1	<0.05	-	<0.05	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	NAD
BH204	0.3-0.4	Fill	<4	<0.4	2	30	-	<0.1	1	0.2	-	1.6	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	0.4	NAD
BH205	0.1-0.2	Fill	<4	<0.4	3	67	-	<0.1	2	1.3	<0.001	10	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH206	0.3-0.4	Fill	<4	<0.4	4	140	0.1	0.1	2	1.7	<0.001	16	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	1.6	NAD
BH207	0.1-0.2	Fill	<4	<0.4	4	98	-	<0.1	2	1.2	<0.001	17	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH208	0.3-0.4	Fill	7	0.6	7	270	0.38	0.2	3	2.9	<0.001	31	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.5	NAD
BH209	0.1-0.2	Fill	<4	0.5	9	350	0.1	0.1	4	1.4	<0.001	13	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	NAD
BH209	0.3-0.4	Fill	<4	<0.4	5	180	-	<0.1	2	0.57	-	5.4	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.2	NAD
BH210	0.2-0.3	Fill	<4	1	5	130	0.1	0.1	3	1.5	<0.001	16	<5	<25	<50	110	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.5	NAD
BH211	0.1-0.2	Fill	<4	0.4	8	130	0.1	0.2	5	0.2	-	2.4	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH211	0.4-0.5	Fill	<4	<0.4	5	130	0.1	0.3	3	0.3	-	3.1	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	NAD
BH212	0.4-0.5	Fill	<4	<0.4	2	4	-	<0.1	1	<0.05	-	<0.05	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH213	0.1-0.2	Fill	<4	<0.4	4	150	0.1	0.2	2	0.3	-	3.7	-	<25	<50	<100	<100	<0.2	<0.5	<1	<3	-	-	-	NAD
BH213	0.3-0.4	Fill	<4	<0.4	4	130	0.1	0.1	3	0.2	-	2.2	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH214	0.1-0.2	Fill	<4	<0.4	3	29	-	<0.1	1	0.07	-	0.2	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
BH215	0.1-0.2	Fill	<4	<0.4	6	190	0.2	<0.1	4	3.2	<0.001	28	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<3	<0.3	<0.1	<0.1	NAD
DP (Oct 2017, Jan 2018) Investigation																									
BH1	0.5-0.6	Fill	<4	<0.4	2	25	-	<0.1	1	0.06		0.81	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH2	0.3-0.4	Fill	<4	<0.4	4	16	-	<0.1	2	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH3	0.1-0.2	Fill	<4	<0.4	46	7	-	<0.1	79	<0.05	-	0.725	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH3	0.7-0.8	Fill	<4	<0.4	1	29	-	<0.1	1	0.07	-	0.82	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH3	1.3-1.43	Natural Sand	<4	<0.4	<1	6	-	<0.1	<1	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH4	0.07-0.15	Roadbase	<4	<0.4	<1	1	-	<0.1	3	57	<0.001	634.3	<5	<25	66	4400	3000	<0.2	<0.5	<1	<1	<1	<1	<1	NAD
BH4	0.5-0.6	Fill	<4	<0.4	3	10	-	<0.1	2	0.52	-	3.82	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH5	0.4-0.5	Fill	<4	<0.4	<1	2	-	<0.1	<1	<0.05	-	0.775	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH5	0.9-1	Natural Sand	<4	<0.4	<1	<1	-	<0.1	<1	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	-
BH5	1.3-1.4	Natural Sand	<4	<0.4	3	2	-	<0.1	1	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	-
BH7	0.1	Fill	<4	<0.4	4	94	-	<0.1	2	0.3	-	2.5	<5	<25	<50	<100	<100	<0.2	<0.5	<1	3	<0.1	<0.1	<0.1	NAD
BH7	0.5	Natural Sand	<4	<0.4	2	6	-	<0.1	1	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	-
BH8	0.4-0.5	Roadbase	<4	<0.4	5	12	-	<0.1	4	-	-	150	<5	<25	860	8500	3800	<0.2	<0.5	<1	<1	<1	<1	<1	NAD
BH8	0.6-0.7	Fill	<4	<0.4	1	<1	-	<0.1	<1	0.2	-	3.45	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH9	0.6-0.7	Fill	<4	<0.4	<1	8	-	<0.1	<1	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH9	1.4-1.5	Fill	<4	<0.4	<1	<1	-	<0.1	<1	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH101	0.5-0.7	Fill	<4	<0.4	4	34	-	0.1	<1	0.1	-	1.15	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH101	1.4-1.6	Natural Sand	<4	<0.4	9	4	-	<0.1	2	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH102	0.3	Fill	5	<0.4	6	53	1.4	0.2	2	0.2	<0.001	2.7	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH103	0-0.3	Fill	<4	0.5	9	450	0.3	0.2	3	1.2	<0.001	9.85	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH103	0.5-0.7	Natural Sand	5	<0.4	26	77	-	0.1	26	1.4	-	11.45	-	<25	<50	100	110	<0.2	<0.5	<1	<1	-	-	-	NAD
BH104	0-0.3	Fill	<4	<0.4	3	20	0.1	<0.1	2	0.63	-	4.03	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH105	0.3-0.5	Fill	<4	<0.4	5	220	0.48	0.1	3	1.2	-	9.2	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH105	0.5-0.7	Natural Sand	<4	0.5	4	110	2	0.1	2	0.3	<0.001	2.4	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH106	0-0.2	Fill	<4	<0.4	3	130	0.2	<0.1	2	1.1	<0.001	10.15	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH106	0.5-0.7	Natural Sand	<4	<0.4	4	130	-	<0.1	2	0.77	-	6.17	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH107	0-0.2	Fill	<4	<0.4	4	90	0.2	<0.1	2	0.91	<0.001	5.86	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH108	0-0.2	Fill	<4	<0.4	7	270	0.2	0.2	4	1.8	<0.001	13.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.5	NAD
BH108	0.7-0.8	Natural Sand	<4	0.7	5	180	2.2	0.1	3	0.73	-	5.43	<5	<25	<50	<100	120	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH109	0-0.2	Fill	<4	<0.4	3	230	<0.03	<0.1	2	0.54	<0.001	3.79	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH110	0-0.2	Fill	<4	<0.4	8	240	-	<0.1	6	0.78	<0.001	6.18	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	0.2	NAD
BH110	0.5-0.7	Natural Sand	<4	0.5	6	280	-	0.2	4	1.5	-	12.05	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH111	0-0.2	Fill	7	0.8	18	470	0.3	0.2	5	6.4	<0.001	50.75	<5	<25	<50	280	260	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.5	NAD
BH112	0-0.2	Natural Sand	6	2	20	440	0.1	0.2	5	0.5	<0.001	3.8	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	0.2	NAD
BH112	0.6-0.7	Fill	<4	<0.4	1	8	-	<0.1	<1	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH113	0.1-0.3	Fill	<4	<0.4	2	28	-	<0.1	<1	0.2	-	2	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH113	0.5-0.7	Natural Sand	<4	<0.4	14	350	0.2	0.1	4	1.2	<0.001	9.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH114	0.5-0.7	Fill	<4	<0.4	5	130	0.2	0.1	2	1.1	<0.001	9.75	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH115	0-0.2	Fill	<4	<0.4	2	10	-	<0.1	1	0.09	-	0.84	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH115	0.5-0.7	Natural Sand	<4	<0.4	9	360	0.1	0.2	4	0.89	<0.001	6.59	-	<25	<50	<100	100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH116	0-0.2	Fill	<4	<0.4	7	360	0.2	0.2	4	1.4	-	14.3	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH117	0.6-0.8	Fill	<4	<0.4	11	6	-	<0.1	2	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH117	1.5-1.6	Natural Sand	<4	<0.4	4	270	0.32	0.3	2	0.52	<0.001	4.72	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH118	0.5-0.6	Fill	<4	0.8	9	350	0.39	0.2	3	0.6	<0.001	4.75	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH119	0.5-0.6	Fill	<4	<0.4	6	100	0.08	<0.1	3	0.3	-	2.4	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH119	1-1.1	Natural Sand	<4	<0.4	2	13	-	<0.1	1	<0.05	-	<1.35	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH120	0-0.1	Fill	13	<0.4	13	21	-	0.2	4	0.07	-	0.82	<5	<25	<50	<100	180	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD
BH121	0-0.05	Fill	4	<0.4	9	290	0.06	<0.1	4	0.2	-	1.95	8	<25	<50	270	410	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.5	NAD
BH122	0-0.1	Fill	<4	<0.4	6	69	-	<0.1	1	0.1	-	1.05	-	<25	<50	<100	<100	<0.2	<0.5	<1	<1	-	-	-	NAD
BH122	0.5-0.6	Natural Sand	<4	<0.4	3	15	-	<0.1	1	<0.05	-	<1.35	<5	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.1	<0.1	<0.1	NAD

Notes

NSW EPA (2014) Waste Classification Guidelines - Part 1: Classifying Waste
^ Duplicate sample is listed below primary sample
NAD Not detected at the laboratory reporting limit of 0.1g/kg
* PCBs must be managed in accordance with the EPA's PCB Chemical Control Order 1997.

Appendix C

Borehole Logs and Groundwater Field Sheets

Sampling Methods

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Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Soil Descriptions

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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

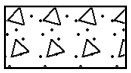
Symbols & Abbreviations

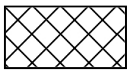
Graphic Symbols for Soil and Rock

General

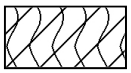

Asphalt

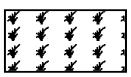

Road base

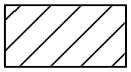

Concrete

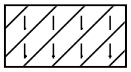

Filling

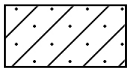
Soils


Topsoil

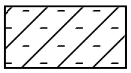

Peat

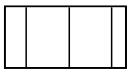

Clay

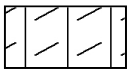

Silty clay

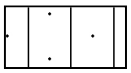

Sandy clay

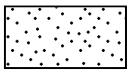

Gravelly clay

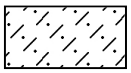

Shaly clay

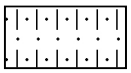

Silt


Clayey silt


Sandy silt

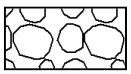

Sand

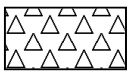

Clayey sand


Silty sand


Gravel

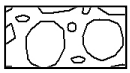

Sandy gravel


Cobbles, boulders

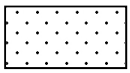

Talus

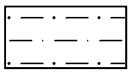
Sedimentary Rocks

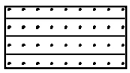

Boulder conglomerate

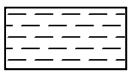

Conglomerate


Conglomeratic sandstone

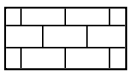

Sandstone


Siltstone

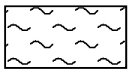

Laminite

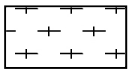

Mudstone, claystone, shale

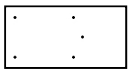

Coal


Limestone

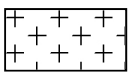
Metamorphic Rocks

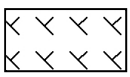

Slate, phyllite, schist

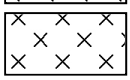

Gneiss

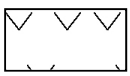

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 54.5 AHD
EASTING: 337080
NORTHING: 6245557

PIT No: TP1
PROJECT No: 72505.14
DATE: 7/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
54	0.0	FILLING - brown silty fine to medium grained sand filling with trace rootlets and igneous gravel		D	0.0 0.01				
	0.2	FILLING - grey-brown silty fine to medium grained sand with trace rootlets, brick fragments and sandstone gravel		D*	0.3 0.4				
	0.5	SAND - yellow, grey fine to medium grained sand with trace coffee rock and sandstone gravel		D	0.6 0.7				
		- Turning yellow at 0.9m							
53	1			D	1.1 1.2				1
				D	1.6				
	1.7	Pit discontinued at 1.7m Target depth reached			1.7				

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD1/20180807 taken at 0.3-0.4m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 48.9 AHD
EASTING: 336979
NORTHING: 6245470

PIT No: TP10
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown silty fine to medium grained filling with trace rootlets, charcoal, igneous gravel, coffee rock and potential ACM fragment		D	0.0				
					0.1				
				D	0.4				
					0.5				
	0.65	SAND - light grey fine to medium sand with trace coffee rock							
48	1	- turning yellow		D	0.9				1
					1.0				
				D	1.3				
	1.4	Pit discontinued at 1.4m Target depth reached			1.4				
47									

RIG: Hand shovel

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *Fragment and 500ml bag sample taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 50.0 AHD
EASTING: 336981
NORTHING: 6245499

PIT No: TP11
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
50		FILLING - light brown silty sand filling with trace rootlets		D	0.0				
					0.1				
	0.3	SAND - yellow fine to medium sand with trace charcoal, coffee rock							
				D	0.4				
					0.5				
49	1	- turning yellow grey		D	1.0				1
					1.1				
				D	1.5				
					1.6				
	1.65	Pit discontinued at 1.65m Target depth reached							

5 10 15 20

RIG: Hand shovel

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 54.6 AHD
EASTING: 337078
NORTHING: 6245525

PIT No: TP2
PROJECT No: 72505.14
DATE: 7/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown-grey silty fine to medium grained sand filling with trace rootlets		D	0.0				
					0.1				
	0.2	FILLING - grey brown silty sand filling with trace rootlets and roots		D	0.2				
					0.3				
54	0.6	SAND - yellow-grey fine to medium grained sand with trace rootlets, roots and coffee rock gravel		D	0.6				
					0.7				
	1								1
		- turning yellow							
				D	1.3				
					1.4				
53				D	1.6				
	1.7	Pit discontinued at 1.7m Target depth reached			1.7				

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 50.5 AHD
EASTING: 337063
NORTHING: 6245473

PIT No: TP3
PROJECT No: 72505.14
DATE: 7/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.05	CONCRETE PAVERS							
	0.1	FILLING - brown silty sand filling with trace rootlets and igneous gravel					* Layer of plastic sheeting at 0.1m depth		
		FILLING - brown-grey silty sand filling with trace rootlets		D	0.1				
					0.2				
	0.3	SAND - light grey fine to medium grained sand with trace coffee rock and sandstone gravel							
50		- turning yellow mottled orange		D	0.4				
					0.5				
	1.0	SAND - fine to medium grained yellow sand with trace coffee rock		D	1.0				1
					1.1				
				D	1.3				
	1.4	Pit discontinued at 1.4m Target depth reached			1.4				
49									

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 53.5 AHD
EASTING: 337091
NORTHING: 6245611

PIT No: TP4
PROJECT No: 72505.14
DATE: 7/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
53	0.0	FILLING - brown silty fine to medium grained sand filling with trace rootlets, brick fragments and plastic sheeting, charcoal		D	0.0				
					0.1				
				D*	0.4				
					0.5				
	0.6	SAND - light grey fine to medium grained sand with trace rootlets		D	0.6				
					0.7				
		- turning yellow brown							
	1								1
52				D	1.5				
	1.6	Pit discontinued at 1.6m Target depth reached			1.6				

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD2/20180807 taken at 0.4-0.5m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 52.6 AHD
EASTING: 336989
NORTHING: 6245527

PIT No: TP5
PROJECT No: 72505.14
DATE: 7/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
52	0.0	FILLING - brown silty fine to medium grained sand filling with trace rootlets		D	0.1				
					0.2				
	0.4	SAND - yellow brown fine to medium rained sand with trace coffee rock		D	0.4				
					0.5				
	1			D	0.9				1
					1.0				
				D	1.4				
51	1.5	Pit discontinued at 1.5m Target depth reached			1.5				

RIG: Hand shovel

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 53.8 AHD
EASTING: 337016
NORTHING: 6245636

PIT No: TP6
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
53		FILLING - brown silty fine to medium grained sand filling with trace rootlets, brick fragments, full bricks, grass and plastic fragments, sandstone gravel (fine to coarse grained), charcoal, coffee rock, clinker, terracota fragments		D	0.0				
					0.1				
				D*	0.4				
					0.5				
	0.9	SAND - yellow orange fine to medium grained sand with trace coffee rock							
	1			D	1.0				1
					1.1				
				D	1.4				
	1.5	Pit discontinued at 1.5m Target depth reached			1.5				
52									

RIG: Hand shovel

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD1/20180808 taken at 0.4-0.5m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 55.1 AHD
EASTING: 336983
NORTHING: 6245638

PIT No: TP7
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
55	0.0	FILLING - brown silty fine to medium grained sand filling with trace rootlets, sandstone gravel		D	0.0				
	0.1				0.1				
	0.2	FILLING - light brown silty sand filling with trace rootlets, crushed sandstone							
	0.3			D*	0.3				
	0.4	- sandstone boulder			0.4				
	0.5	SAND - yellow fine to medium grained sand							
	0.7			D	0.7				
	0.8				0.8				
	0.9	Pit discontinued at 0.9m Target depth reached							
54	1								1

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD2/20180808 taken at 0.3-0.4m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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

TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 46.6 AHD
EASTING: 337060
NORTHING: 6245413

PIT No: TP8
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
46	0.0	FILLING - dark brown grey silty sand filling with trace rootlets, plastic fragments, coffee rock, brick fragments, metal sheeting		D	0.0				
	0.1				0.1				
	0.5			D	0.5				
	0.6				0.6				
	0.8	SAND - light brown fine to medium grained sand with trace coffee rock							
	1			D	0.9				1
					1.0				
		- turning light grey with trace orange clay		D	1.3				
	1.4	Pit discontinued at 1.4m Bucket refusal on hard sandstone boulder			1.4				
45									

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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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TEST PIT LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 47.4 AHD
EASTING: 336982
NORTHING: 6245426

PIT No: TP9
PROJECT No: 72505.14
DATE: 8/8/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
47	0.0	FILLING - brown silty sand filling with trace rootlets, river pebbles, terracota pipe, brick fragments		D	0.0				
					0.1				
		- Potential ACM at 0.4-0.5m							
	0.5	Pit discontinued at 0.5m Terminated due to potential ACM							
	1								1
46									

RIG: 1.7T excavator

LOGGED: NW

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: ** Fragment and 500ml sample taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

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: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 50.4 AHD
EASTING: 336958
NORTHING: 6245514
DIP/AZIMUTH: 90°/--

BORE No: BH201
PROJECT No: 72505.14
DATE: 26-6-2018
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
50	0.05	BRICK PAVEMENT							
		FILLING: brown silty sand filling with trace of rootlets, brick fragments, sandstone gravel, charcoal and clinker		D	0.2		PID=1 ppm		
	0.3	FILLING: yellow-brown sandy filling with a trace of brick fragments, coffee rock gravel (M)		D	0.3 0.4		PID=1 ppm		
	0.5	SAND: yellow-brown fine to medium sand			0.5				
	1								1
49	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free ground water observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 52.9 AHD
EASTING: 337065
NORTHING: 6245617
DIP/AZIMUTH: 90°/--

BORE No: BH202
PROJECT No: 72505.14
DATE: 26-6-2018
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
52	0.05	CONCRETE PAVERS							Flush gatic cover
	0.1	FILLING: light grey-brown slightly silty fine to medium sand filling with some gravels (terracotta & igneous)		A	0.3 0.4		PID<1 ppm		
	1.0	FILLING: light grey-brown silty fine to medium sand filling with trace of rootlets		A	0.9 1.0		PID=<1 ppm		
51		SAND: light grey slightly silty fine to medium sand, moist		A	1.2 1.3		PID=<1 ppm		Gravel
		1.3m: becoming brown		A			PID=<1 ppm		
		2.0m: becoming yellow-grey			2.0				
		2.5m: becoming dark grey							
50	3.0	SANDSTONE: very low to low strength, light yellow, sandstone							Bentonite
	3.5	SANDSTONE: light grey-yellow sandstone			3.5		Auger refusal at 3.5m		
49									
48									
47									Machine slotted PVC screen
46									Gravel
45									
44									
43	10.05	Bore discontinued at 10.05m Target depth reached							End cap
42									

RIG: Bobcat **DRILLER:** Marino **LOGGED:** JJH **CASING:** HW to 3.5m

TYPE OF BORING: Solid flight auger to 3.0m, NMLC-coring to 10.05m

WATER OBSERVATIONS: Free ground water observed at 3.0m

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 54.2 AHD
EASTING: 336974
NORTHING: 6245586
DIP/AZIMUTH: 90°/--

BORE No: BH204
PROJECT No: 72505.14
DATE: 27-6-2018
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
54	0.1	CONCRETE: 10-20mm aggregate		A	0.1		PID=<1 ppm		Flush gatic cover
	0.4	FILLING: brown-grey slightly silty fine to medium sand filling		A	0.2 0.3 0.4		PID=1 ppm		
53	1	SAND: light grey slightly silty fine to medium sand 0.7m: becoming yellow-brown							
52	2								Gravel
51	3								
50	4								
	4.7	SANDSTONE: low strength, light grey sandstone							Bentonite
49	5								
	5.2	SANDSTONE: medium to high strength, light grey-brown sandstone							
48	6								Machine slotted PVC screen
47	7								Gravel
46	8								
45	9								
	10.0	Bore discontinued at 10.0m Target depth reached							End cap

RIG: Bobcat **DRILLER:** Marino **LOGGED:** JJH **CASING:** HW to 5.0m

TYPE OF BORING: Solid flight auger to 5.0m, NMLC-coring to 10.00m

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 49.8 AHD
EASTING: 336953
NORTHING: 6245472
DIP/AZIMUTH: 90°/--

BORE No: BH205
PROJECT No: 72505.14
DATE: 25-6-2018
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
		CONCRETE: concrete slab with 10-20mm aggregate							
	0.1	FILLING: light grey-brown silty fine to medium sand filling with some asphaltic gravels, humid		D*	0.1		PID<1 ppm		
					0.2				
				D	0.3		PID<1 ppm		
					0.4				
	0.6	SAND: yellow-brown fine to medium sand							
49									
					0.9				
	1			D			PID<1 ppm		1
	1.1	Bore discontinued at 1.1m Target depth reached			1.0				
48									

RIG: Hand auger **DRILLER:** JJH **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free ground water observed whilst augering
REMARKS: *BD1/20180625 taken at 0.1-0.2m

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: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 53.4 AHD
EASTING: 337049
NORTHING: 6245656
DIP/AZIMUTH: 90°/--

BORE No: BH206
PROJECT No: 72505.14
DATE: 25-6-2018
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
53		FILLING: brown-grey silty fine to medium sand filling with rootlets, damp							
				D	0.3		PID=<1 ppm		
					0.4				
	0.5	SAND: light brown-yellow slightly silty fine to medium sand with trace of rootlets, damp							
		0.7m: becoming light brown-grey							
				D	0.9		PID=2 ppm		
	1				1.0				1
	1.1	Bore discontinued at 1.1m Target depth reached							
52									

RIG: Hand auger **DRILLER:** JJH **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free ground water observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 52.7 AHD
EASTING: 337044
NORTHING: 6245630
DIP/AZIMUTH: 90°/--

BORE No: BH207
PROJECT No: 72505.14
DATE: 25-6-2018
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
52	0.1	FILLING: dark brown silty sand filling with a trace of rootlets (topsoil)							
		FILLING: light brown grey silty sand filling with trace of rootlets, terracotta fragments, damp		D	0.1		PID=3 ppm		
					0.2				
	0.35	SAND: light yellow-brown silty sand, damp							
				D	0.6		PID=3 ppm		
		0.85m: turning light grey			0.7				
	0.9	SANDY SILT: dark brown-grey sandy silt with trace of charcoal, damp							
51	1 1.0	Bore discontinued at 1.0m Target depth reached							1

RIG: Hand auger **DRILLER:** JJH **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free ground water observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 52.7 AHD
EASTING: 337010
NORTHING: 6245596
DIP/AZIMUTH: 90°/--

BORE No: BH208
PROJECT No: 72505.14
DATE: 25-6-2018
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
52	0.05	CONCRETE PAVERS							
		FILLING: yellow-brown medium to coarse sand filling with some igneous gravel (5-20mm)		D	0.1		PID=1 ppm		
	0.2	FILLING: dark brown-grey silty sand filling with trace of glass fragments, fine igneous gravel		D	0.3		PID=<1 ppm		
					0.4				
	0.5	SILTY SAND: light grey silty sand		D	0.5		PID=<1 ppm		
	0.7	SILTY SAND: red-brown mottled silty sand with some sandstone gravels and trace of charcoal			0.6				
	1								1
51	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Hand auger **DRILLER:** JJH **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 53.7 AHD
EASTING: 337071
NORTHING: 6245650
DIP/AZIMUTH: 90°/--

BORE No: BH209
PROJECT No: 72505.14
DATE: 26-6-2018
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
53		FILLING: brown-grey slightly silty sand filling with some rootlets (topsoil)		D	0.1		PID<1 ppm		
	0.3	FILLING: light brown slightly silty sand filling with trace of brick fragments and glass		D	0.3		PID<1 ppm		
	0.5	SAND: light brown-yellow slightly silty sand			0.4				
		0.7m: becoming mottled grey-yellow							
		0.9m: becoming light grey							
	1								1
52	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 54.6 AHD
EASTING: 337101
NORTHING: 6245651
DIP/AZIMUTH: 90°/--

BORE No: BH210
PROJECT No: 72505.14
DATE: 26-6-2018
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
54	0.4	FILLING: light brown-grey slightly silty sand filling with some rootlets and trace igneous gravels		D	0.2		PID<1 ppm		
					0.3				
		SAND: light brown-yellow slightly silty fine to medium sand with trace of sandstone gravels		D	0.6		PID<1 ppm		
		0.7m: becoming light grey			0.7				
	1								1
53	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 53.5 AHD
EASTING: 337089
NORTHING: 6245011
DIP/AZIMUTH: 90°/--

BORE No: BH211
PROJECT No: 72505.14
DATE: 26-6-2018
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
53		FILLING: brown silty sand filling with trace of rootlets, fine to medium sandstone gravel and brick fragments, damp		D	0.1		PID<1 ppm		
					0.2				
				D	0.4		PID=1 ppm		
					0.5				
	0.7	SAND: grey, fine to medium sand with trace of charcoal, damp		D	0.8		PID<1 ppm		
					0.9				
	1	1.1m: turning yellow-brown							1
52	1.3	Bore discontinued at 1.3m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** NW **CASING:** Uncased
TYPE OF BORING: Hand auger
WATER OBSERVATIONS: No free ground water observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 52.4 AHD
EASTING: 337059
NORTHING: 6245584
DIP/AZIMUTH: 90°/--

BORE No: BH212
PROJECT No: 72505.14
DATE: 26-6-2018
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
52	0.1	CONCRETE SLAB							
		FILLING: yellow-brown sand filling with trace of medium sandstone gravel, rootlets, damp		D	0.2		PID=1 ppm		
					0.3				
				D*	0.4		PID<1 ppm		
	0.5	SAND: yellow medium sand, damp			0.5				
	1								1
51	1.05	Bore discontinued at 1.05m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD2/20180626 taken at 0.4-0.5m

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: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 54.4 AHD
EASTING: 337083
NORTHING: 6245579
DIP/AZIMUTH: 90°/--

BORE No: BH213
PROJECT No: 72505.14
DATE: 26-6-2018
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
54	0.1	FILLING: brown silty sand filling with trace of rootlets and medium gravel, damp		D	0.1		PID=<1 ppm		
	0.2				0.2				
	0.3	0.3m: trace of charcoal and clinker		D*	0.3		PID=<1 ppm		
	0.4				0.4				
	0.6	SAND: brown-grey sand with a trace of sandstone gravel, damp							
	0.7			D	0.7		PID=<1 ppm		
	0.8	Bore discontinued at 0.8m Refusal on low strength sandstone			0.8				
53	1								1

RIG: Hand auger **DRILLER:** NW **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD3/20180626 taken at 0.3-0.4m

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: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 51.0 AHD
EASTING: 337051
NORTHING: 6245491
DIP/AZIMUTH: 90°/--

BORE No: BH214
PROJECT No: 72505.14
DATE: 26-6-2018
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
51	0.06	CONCRETE SLAB							
		FILLING: yellow-brown fine to medium sand filling with trace of fine sandstone gravel, damp		D	0.1				
					0.2				
				D	0.4				
					0.5				
	0.6	SAND: yellow fine to medium sand, damp							
50	1	0.9m: sandstone gravels							1
	1.1	Bore discontinued at 1.1m Target depth reached							

RIG: Hand auger **DRILLER:** NW **LOGGED:** NW **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

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

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BOREHOLE LOG

CLIENT: Lendlease Building Pty Limited
PROJECT: Randwick Campus Redevelopment
LOCATION: Bound by High, Magill, Botany Streets and Hospital Road, Randwick

SURFACE LEVEL: 56.4 AHD
EASTING: 336983
NORTHING: 6245648
DIP/AZIMUTH: 90°/--

BORE No: BH215
PROJECT No: 72505.14
DATE: 29-6-2018
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
56	0.05	FILLING: dark brown silty sand filling with igneous gravels, damp							
		FILLING: brown slightly silty sand with rootlets and some igneous gravels, damp		D*	0.1				
					0.2				
	0.35	SAND: yellow sand with trace of silt, damp		D	0.4				
					0.5				
55	1.0	Bore discontinued at 1.0m Target depth reached							1

RIG: Hand auger **DRILLER:** JJH **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Hand auger

WATER OBSERVATIONS: No free ground water observed whilst augering

REMARKS: *BD4/20180629 taken at 0.1-0.2m

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

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH202
Project Name:	Landwick Campus Development
Project Number:	72505.4
Site Location:	Eurimbla Ave, Botany St. Landwick
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	29/6/18 1130
Purged By:	SSH
GW Level (pre-purge):	2.40 m bgl
GW Level (post-purge):	—— m bgl
PSH observed:	Yes / (No) (interface / visual?). Thickness if observed:
Observed Well Depth:	8.57 m bgl
Estimated Bore Volume:	44.5 L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) ~40L → DRY
Equipment:	Twister pump, interface meter

Micropurge and Sampling Details	
Date/Time:	6/7/18
Sampled By:	SSH
Weather Conditions:	clear
GW Level (pre-purge):	2.42 m bgl
GW Level (post sample):	3.56 m bgl
PSH observed:	Yes / (No) (interface / (visual)). Thickness if observed:
Observed Well Depth:	8.84 m bgl
Estimated Bore Volume:	46.2 L
Total Volume Purged:	~8 L
Equipment:	Peripump, interface meter, warm

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1°C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
0830	17.2	2.29	788	6.33	—	271
0831	18.8	1.66	778	6.44	53	254
0832	19.2	1.53	779	6.48	31.2	241
0833	19.3	1.78	778	6.51	32.2	229
0834	19.3	1.83	781	6.54	28.0	219
0835	19.3	2.15	781	6.57	21.5	208
0836	19.3	2.27	781	6.59	28.8	202
	19.3	7.36	782	6.60	27.4	199
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	5 m bgl, middle of water column
Sample Appearance (e.g. colour, siltiness, odour):	Very slightly, light grey cloudy
Sample ID:	BH202
QA/QC Samples:	BD1/20180706 taken
Sampling Containers and filtration:	1x Amber 3x vials 1x real (filtered)
Comments / Observations:	——

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_2^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH 204
Project Name:	Randwick Campus Development
Project Number:	72505.14
Site Location:	Eurimbla Ave, Botany St, Randwick
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	29.6.18 1300
Purged By:	JSH
GW Level (pre-purge):	5.04 m bgl
GW Level (post-purge):	— m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	9.82 m bgl
Estimated Bore Volume:	34.5 L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) ~30L Dry
Equipment:	Trash pump, interface meter

Micropurge and Sampling Details	
Date/Time:	6.7.18 1100
Sampled By:	JSH
Weather Conditions:	Clear
GW Level (pre-purge):	5.05 m bgl
GW Level (post sample):	5.96 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	9.92 m bgl
Estimated Bore Volume:	35.0 L
Total Volume Purged:	4 L
Equipment:	Peripump, Interface meter, WQM

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
1120	23.9	2.74	285	5.10	—	202
1121	22.0	2.35	286	5.09	63	196
1122	21.0	2.12	286	5.08	34.5	194
1123	20.9	2.21	287	5.09	31.7	196
1124	20.8	2.30	285	5.09	35.7	193
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	7.5 m bgl, Middle of column
Sample Appearance (e.g. colour, siltiness, odour):	Clear
Sample ID:	BH204
QA/QC Samples:	—
Sampling Containers and filtration:	1x Amber, 3x Vials, 1x Red (filtered)
Comments / Observations:	—

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_1^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH11
Project Name:	
Project Number:	
Site Location:	
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	
Micropurge and Sampling Details	
Date/Time:	1400 6.7.18
Sampled By:	TSM
Weather Conditions:	clear
GW Level (pre-purge):	4.4 m bgl
GW Level (post sample):	5.29 m bgl
PSH observed:	Yes / (No) (interface / (visual). Thickness if observed:
Observed Well Depth:	7.17 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	L
Equipment:	Peripump, interface meter, WQM

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1°C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
1435	22.7	1.81	456	6.29	8.6	90
1436	21.7	1.67	451	6.32	106	71
1437	21.1	1.63	441	6.26	126	45
1438	20.9	1.52	444	6.30	132	10
1439	20.8	1.96	446	6.39	130	5
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	6 m bgl, middle of column
Sample Appearance (e.g. colour, siltiness, odour):	Slightly brown-grey cloudy
Sample ID:	BH11
QA/QC Samples:	—
Sampling Containers and filtration:	1x Amber 3x VOAs 1x Red (Filtered)
Comments / Observations:	Sample before stabilisation → difficulty purging BH10 Unable to continue pumping before stabilisation

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_1^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$
Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing
Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH14
Project Name:	Randwick Campus Development
Project Number:	72505.14
Site Location:	Eurimbla Ave, Botany St (Randwick
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	
Purged By:	JP
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	

Micropurge and Sampling Details	
Date/Time:	1200 6.7.18
Sampled By:	SSH
Weather Conditions:	clear
GW Level (pre-purge):	3.55 m bgl
GW Level (post sample):	3.56 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	7.61 m bgl
Estimated Bore Volume:	29.2 L
Total Volume Purged:	4 L
Equipment:	Peristaltic pump, interface meter, WQM

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
1250	21.9	6.97	477	6.45	—	183
1251	20.3	6.85	506	6.62	42.2	177
1252	19.9	7.01	512	6.66	29.5	175
1253	19.7	6.98	515	6.70	23.0	175
1254	19.6	7.16	513	6.70	20.3	175
1255	19.5	7.22	511	6.70	19.5	176
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	6 m bgl, middle of colu-
Sample Appearance (e.g. colour, siltiness, odour):	very slightly (light-grey cloudy
Sample ID:	BH14
QA/QC Samples:	
Sampling Containers and filtration:	1x Ambers 3x Vials 1x Red (filtered)
Comments / Observations:	Car partially blocking access; not bailed for PSH

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_1^2/4 + n(\pi h_1 d_1^2/4 - \pi h_2 d_2^2/4)$

Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing

Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH16
Project Name:	Rudwick Campus Development
Project Number:	72505.14
Site Location:	Botany St, Eastern Ave Rockhampton
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-
Bore Development Details	
Date/Time:	
Purged By:	JP
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	
Micropurge and Sampling Details	
Date/Time:	6.7.18 0900
Sampled By:	JSM
Weather Conditions:	clear
GW Level (pre-purge):	3.74 m bgl
GW Level (post sample):	4.27 m bgl
PSH observed:	Yes / (No) (interface / (visual)). Thickness if observed:
Observed Well Depth:	5.80 m bgl
Estimated Bore Volume:	14.8 L
Total Volume Purged:	4 L
Equipment:	Peristaltic pump, interface meter, WQM

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	**0.1° C**	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
0930	18.6	2.62	421	6.89	—	242
0931	18.7	2.76	359	7.06	—	229
0932	19.1	4.01	358	7.13	—	214
0933	19.1	4.93	365	7.21	20.6	209
34	19.2	4.78	382	7.26	22.3	209
35	19.3	4.89	386	7.34	18.2	208
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	4 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	Very slightly light grey
Sample ID:	BH16
QA/QC Samples:	—
Sampling Containers and filtration:	1x Amber 3x Vials 1x Red (filtered)
Comments / Observations:	—

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Groundwater Field Sheet

Bore Volume = casing volume + filter pack volume
$= \pi h_1 d_1^2/4 + n(\pi h_2 d_1^2/4 - \pi h_2 d_2^2/4)$

Where: $\pi = 3.14$
n = porosity (0.3 for most filter pack material)
h_1 = height of water column
d_1 = diameter of annulus
h_2 = length of filter pack
d_2 = diameter of casing

Bore Vol Normally: 7.2*h

Project and Bore Installation Details	
Bore / Standpipe ID:	BH 17
Project Name:	Rockwell Campus Development
Project Number:	72505.14
Site Location:	Botany St, Burrabba Ave, Rockwell
Bore GPS Co-ord:	
Installation Date:	
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	
Purged By:	
GW Level (pre-purge):	m bgl
GW Level (post-purge):	m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry)
Equipment:	

Micropurge and Sampling Details	
Date/Time:	6.7.18 10 00
Sampled By:	SSH
Weather Conditions:	clear
GW Level (pre-purge):	4.07 m bgl
GW Level (post sample):	4.21 m bgl
PSH observed:	Yes / (No) (interface / (visual)). Thickness if observed:
Observed Well Depth:	9.78 m bgl
Estimated Bore Volume:	41.5 L
Total Volume Purged:	4 L
Equipment:	Peristaltic pump, interface meter, WQM

Water Quality Parameters

Time / Volume	Temp (°C)	DO (mg/L)	EC (µS or mS/cm)	pH	Turbidity	Redox (mV)
Stabilisation Criteria (3 readings)	***0.1° C***	**+/- 0.3 mg/L**	**+/- 3%**	**+/- 0.1**	**+/- 10%**	**+/- 10 mV**
10 05	19.1	1.83	369	5.67	—	207
10 06	19.8	0.89	368	5.53	23.5	200
10 07	20.1	1.02	366	5.50	18.9	197
10 08	20.2	1.11	364	5.51	16.3	197
10 09	20.2	1.15	364	5.52	15.2	196
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	7 m bgl, Middle of column
Sample Appearance (e.g. colour, siltiness, odour):	Very slightly cloudy
Sample ID:	BH17
QA/QC Samples:	
Sampling Containers and filtration:	1x Amber 3x Vials 1x Red (filtered
Comments / Observations:	Oily residue on level logger line

Appendix D

Data Quality Assessment

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

The preliminary site investigation 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	S12 Conclusions and Recommendations
Identify Inputs to the Decision	S1 Introduction S2 Scope of Works S3 Site Identification S4 Proposed Development S5 Previous Investigation S6 CSM S9 Fieldwork Results S10 Laboratory Summary Results
Define the Boundary of the Assessment	S3 Site Identification S7 Fieldwork (vertical extent of investigation) Drawing 1 (Appendix A)
Develop a Decision Rule	S8 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	S8 Site Assessment Criteria Data Quality Assessment – Sections Q2, Q3
Optimise the Design for Obtaining Data	S2 Scope of Works S7 Fieldwork Data Quality Assessment – 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 data quality indicators in Table Q6 and the laboratory results certificates in Appendix E for further details.

Table Q2: Field QC

Item	Frequency	Acceptance Criteria	Achievement
Intra-laboratory replicates	>5% primary samples	RPD <30% inorganics), <50% (organics)	yes[1]
Inter-laboratory replicates	>5% 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

Note: 1 qualitative assessment of RPD results overall; refer Section Q2.1 and Q2.2

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	ok
Laboratory / Reagent Blanks	1 per lab batch	<PQL	yes
Laboratory duplicates	10% primary samples	Laboratory specific	Yes
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

A 5% inter-laboratory analysis frequency was achieved for soils and a 5% intra-laboratory sampling analysis frequency was achieved.

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 Pty Ltd (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 with the exception of the results shown in bold. However, this is not considered to be significant because:

- The typically low actual differences in the concentrations of the replicate pairs where some RPD exceedances occurred. High RPD values reflect the small differences between two small numbers;
- The number of replicate pairs being collected from fill soils which were heterogeneous in nature;
- Soil replicates, rather than homogenised duplicates, were used to minimise the risk of volatile loss, hence greater variability can be expected;
- Most of the recorded concentrations being relatively close to the LOR/PQL. High RPD values reflect the low concentrations;
- The majority of RPDs within a replicate pair being within the acceptable limits; and
- All other QA/QC parameters met the DQIs.

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

Q2.2 Inter-Laboratory Analysis

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

The comparative results of analysis between intra 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.

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

Q2.3 Field Instrument Calibration

The photoionisation detector (PID) fitted with a [11.7 volt lamp] was calibrated and serviced prior to use on the field. Prior to commencement of groundwater sampling the water quality meter was calibrated in the field prior to use.

Table Q4: Relative Percentage Difference Results Intra-laboratory Replicates (Soil)

			Metals								PAH				TRH						BTEX			
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene	Benzo(a)pyrene (BaP)	Total PAHs	Benzo(a)pyrene TEQ	TRH C6 - C10	TRH >C10-C16	F3 (>C16-C34)	F4 (>C34-C40)	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Total Xylenes
Sample ID	Sampled Date	Units																						
BH213	26/06/2018	mg/kg	<4	<0.4	4	23	130	0.1	3	170	<1	0.2	2.2	<0.5	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1
BD1/20180625	26/06/2018	mg/kg	<4	<0.4	4	29	140	<0.1	3	88	<1	1.2	8.9	1.7	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1
		Difference	0	0	0	6	10	0	0	82	0	1	6.7	1.2	0	0	0	0	0	0	0	0	0	0
		RPD	0 %	0 %	0 %	23 %	7 %	0 %	0 %	**64 %**	0 %	**143 %**	**121 %**	**109 %**	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %

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

			Metals								PAH			TRH						BTEX			
			Arsenic	Cadmium	Chromium (VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	TRH C6 - C10	TRH >C10-C16	F3 (>C16-C34)	F4 (>C34-C40)	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	Benzene	Toluene	Ethylbenzene	Total Xylenes
Sample ID	Sampled Date	Units																					
BD1/20180625	25/06/2018	mg/kg	<4	<0.4	4	29	140	<0.1	3	88	<1	1.2	1.7	<25	<50	<100	<100	<25	<50	<0.2	<0.5	<1	<1
BD2/20180626	25/06/2018	mg/kg	<5	<1	2	<5	<5	<0.1	<2	7	<1	<0.5	<0.5	<10	<50	<100	<100	<10	<50	<0.2	<0.5	<0.5	<0.5
		Difference	0	0	2	24	135	0	1	81	0	0.7	1.2	0	0	0	0	0	0	0	0	0	0
		RPD	0%	0%	**67 %**	**141 %**	**186 %**	0 %	**40 %**	**171 %**	0 %	**82 %**	**109 %**	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0%

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 Q6.

Table Q6: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Preparation of field logs, sample location plan and chain of custody (COC) records; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for the primary contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM). Future investigations will target potential contaminants not analysed; 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 or geotechnical engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Samples were extracted and generally analysed within holding times. Samples were analysed in accordance with the analysis request. It is noted that a report comment is made by ELS with respect to sub-sampled asbestos from soil jars. This is expected and acceptable for analytical requirements.

Data Quality Indicator	Method(s) of Achievement
Precision	Acceptable RPD between original samples and replicates. Overall, satisfactory results were achieved 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 E

Laboratory Certificates

Chain of Custody Documentation

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 195811

Client Details

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

Sample Details

Your Reference	**72505-14, Randwick Campus Development**
Number of Samples	7 Water
Date samples received	09/07/2018
Date completed instructions received	09/07/2018

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	16/07/2018
Date of Issue	13/07/2018

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

Results Approved By
Jaimie Loa-Kum-Cheung, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

VOCs in water						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018	11/07/2018	11/07/2018	11/07/2018
Dichlorodifluoromethane	µg/L	<10	<10	<10	<10	<10
Chloromethane	µg/L	<10	<10	<10	<10	<10
Vinyl Chloride	µg/L	<10	<10	<10	<10	<10
Bromomethane	µg/L	<10	<10	<10	<10	<10
Chloroethane	µg/L	<10	<10	<10	<10	<10
Trichlorofluoromethane	µg/L	<10	<10	<10	<10	<10
1,1-Dichloroethene	µg/L	<1	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	<1	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	<1	<1	<1	<1	<1
Chloroform	µg/L	<1	3	<1	<1	2
2,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	<1	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	<1	<1	<1	<1	<1
Cyclohexane	µg/L	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	<1	<1	<1	<1	<1
Benzene	µg/L	<1	<1	<1	<1	<1
Dibromomethane	µg/L	<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	<1	<1	<1	<1	<1
Trichloroethene	µg/L	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	<1	1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
1,3-dichloropropane	µg/L	<1	<1	<1	<1	<1
Dibromochloromethane	µg/L	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	1	<1	<1	<1
Bromoform	µg/L	<1	<1	<1	<1	<1

VOCs in water						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
m+p-xylene	µg/L	<2	9	<2	<2	<2
Styrene	µg/L	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1	<1	<1	<1
o-xylene	µg/L	<1	4	<1	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1	<1	<1	<1
Isopropylbenzene	µg/L	<1	<1	<1	<1	<1
Bromobenzene	µg/L	<1	<1	<1	<1	<1
n-propyl benzene	µg/L	<1	<1	<1	<1	<1
2-chlorotoluene	µg/L	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	<1	<1	<1	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	5	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	5	<1	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
Sec-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
4-isopropyl toluene	µg/L	<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1	<1	<1	<1
n-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	118	126	126	111	130
Surrogate toluene-d8	%	105	94	95	94	96
Surrogate 4-BFB	%	93	98	88	83	88

VOCs in water			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
Date extracted	-	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	<10	<10
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	<1	<1
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	<1
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	<1
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
Bromoform	µg/L	<1	<1

VOCs in water			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	128	127
Surrogate toluene-d8	%	95	95
Surrogate 4-BFB	%	88	88

vTRH(C6-C10)/BTEXN in Water						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018	11/07/2018	11/07/2018	11/07/2018
TRH C_6 - C_9	µg/L	<10	22	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	53	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	39	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	1	<1	<1	<1
m+p-xylene	µg/L	<2	9	<2	<2	<2
o-xylene	µg/L	<1	4	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	118	126	126	111	130
Surrogate toluene-d8	%	105	94	95	94	96
Surrogate 4-BFB	%	93	98	88	83	88

vTRH(C6-C10)/BTEXN in Water			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
Date extracted	-	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	128	127
Surrogate toluene-d8	%	95	95
Surrogate 4-BFB	%	88	88

svTRH (C10-C40) in Water						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018	11/07/2018	11/07/2018	11/07/2018
TRH C_{10} - C_{14}	µg/L	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	79	86	76	70	107

svTRH (C10-C40) in Water			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
Date extracted	-	10/07/2018	10/07/2018
Date analysed	-	12/07/2018	11/07/2018
TRH C_{10} - C_{14}	µg/L	94	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
TRH >C_{10} - C_{16}	µg/L	74	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	74	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Surrogate o-Terphenyl	%	90	75

PAHs in Water						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018	11/07/2018	11/07/2018	11/07/2018
Naphthalene	µg/L	<1	<1	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1	<1	<1
Fluorene	µg/L	<1	<1	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1	<1	<1
Anthracene	µg/L	<1	<1	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1	<1	<1
Pyrene	µg/L	<1	<1	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1	<1	<1
Chrysene	µg/L	<1	<1	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	101	97	94	102	110

PAHs in Water			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
Date extracted	-	10/07/2018	10/07/2018
Date analysed	-	11/07/2018	11/07/2018
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	94	77

HM in water - dissolved						
Our Reference		195811-1	195811-2	195811-3	195811-4	195811-5
Your Reference	UNITS	BH202	BH204	BH11	BH14	BH16
Date Sampled		06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Date analysed	-	10/07/2018	10/07/2018	10/07/2018	10/07/2018	10/07/2018
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	0.1	<0.1	<0.1	0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	2	8	5	7	12
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	5	2	<1	<1	1
Zinc-Dissolved	µg/L	31	28	13	55	7

HM in water - dissolved			
Our Reference		195811-6	195811-7
Your Reference	UNITS	BH17	BD1/20180706
Date Sampled		06/07/2018	06/07/2018
Type of sample		Water	Water
Date prepared	-	10/07/2018	10/07/2018
Date analysed	-	10/07/2018	10/07/2018
Arsenic-Dissolved	µg/L	<1	<1
Cadmium-Dissolved	µg/L	<0.1	0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	3	1
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	4
Zinc-Dissolved	µg/L	8	26

Method ID	Methodology Summary
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-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: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			10/07/2018	2	10/07/2018	11/07/2018		10/07/2018	[NT]
Date analysed	-			11/07/2018	2	11/07/2018	12/07/2018		11/07/2018	[NT]
Dichlorodifluoromethane	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-013	<10	2	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	105	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-013	<1	2	3	3	0	114	[NT]
2,2-dichloropropane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	119	[NT]
1,1,1-trichloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	119	[NT]
1,1-dichloropropene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-013	<1	2	<1	<1	0	101	[NT]
Bromodichloromethane	µg/L	1	Org-013	<1	2	1	1	0	116	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-013	<1	2	<1	<1	0	114	[NT]
1,2-dibromoethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-013	<1	2	<1	<1	0	110	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-013	<1	2	1	1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-013	<2	2	9	8	12	[NT]	[NT]
Styrene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
o-xylene	µg/L	1	Org-013	<1	2	4	4	0	[NT]	[NT]

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	2	5	5	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	2	5	5	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-013	125	2	126	125	1	116	[NT]
Surrogate toluene-d8	%		Org-013	95	2	94	95	1	96	[NT]
Surrogate 4-BFB	%		Org-013	85	2	98	98	0	110	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			10/07/2018	2	10/07/2018	11/07/2018		10/07/2018	[NT]
Date analysed	-			11/07/2018	2	11/07/2018	12/07/2018		11/07/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	2	22	19	15	99	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	2	53	50	6	99	[NT]
Benzene	µg/L	1	Org-016	<1	2	<1	<1	0	102	[NT]
Toluene	µg/L	1	Org-016	<1	2	<1	<1	0	95	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	2	1	1	0	95	[NT]
m+p-xylene	µg/L	2	Org-016	<2	2	9	8	12	102	[NT]
o-xylene	µg/L	1	Org-016	<1	2	4	4	0	106	[NT]
Naphthalene	µg/L	1	Org-013	<1	2	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	125	2	126	125	1	116	[NT]
Surrogate toluene-d8	%		Org-016	95	2	94	95	1	96	[NT]
Surrogate 4-BFB	%		Org-016	85	2	98	98	0	110	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	195811-2
Date extracted	-			11/07/2018	1	10/07/2018	10/07/2018		10/07/2018	10/07/2018
Date analysed	-			12/07/2018	1	11/07/2018	11/07/2018		11/07/2018	11/07/2018
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	1	<50	<50	0	100	130
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	1	<100	<100	0	110	100
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	1	<100	<100	0	86	101
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	1	<50	<50	0	100	130
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	1	<100	<100	0	110	100
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	1	<100	<100	0	86	101
Surrogate o-Terphenyl	%		Org-003	101	1	79	80	1	100	86

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	195811-2
Date extracted	-			10/07/2018	1	10/07/2018	10/07/2018		10/07/2018	10/07/2018
Date analysed	-			11/07/2018	1	11/07/2018	11/07/2018		11/07/2018	11/07/2018
Naphthalene	µg/L	1	Org-012	<1	1	<1	<1	0	77	75
Acenaphthylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	1	<1	<1	0	87	120
Phenanthrene	µg/L	1	Org-012	<1	1	<1	<1	0	71	100
Anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	1	<1	<1	0	71	102
Pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	74	93
Benzo(a)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	1	<1	<1	0	86	87
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	1	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	90	104
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	117	1	101	105	4	78	95

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	195811-2
Date prepared	-			10/07/2018	1	10/07/2018	10/07/2018		10/07/2018	10/07/2018
Date analysed	-			10/07/2018	1	10/07/2018	10/07/2018		10/07/2018	10/07/2018
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	108	106
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	0.1	0.1	0	108	106
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	101	99
Copper-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	107	105
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	108	105
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	107	107
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	5	4	22	104	100
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	31	29	7	106	106

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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

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:	72505.14	**Suburb:**	Randwick	**To:**	EnviroLab
Project Name:	Randwick Campus Development	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Paul Gorman	**Sampler:**	Joel J-H	**Attn:**	Aileen Hie
Emails:	paul.gorman@douglaspartners.com.au; joel.james-hall@douglaspartners.com			**Phone:**	(02) 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 (S - soil, W - water)	Container Type (G, P)	Analytes: Combo 3	VOC								Notes/preservation
BH202		06/07/18	W	G/P	x	x								
BH204		06/07/18	W	G/P	x	x								
BH11		06/07/18	W	G/P	x	x								
BH14		06/07/18	W	G/P	x	x								
BH16		06/07/18	W	G/P	x	x								
BH17		06/07/18	W	G/P	x	x								
BD1/20180706		06/07/18	W	G/P	x	x								
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐	

N2349361

ENVIROLAB Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200
Job No: 105811
Date Received: 9/7/18
Time Received: 1400
Received by: KM
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: | **Relinquished by:** | **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd | **Address:** | **Phone:** | **Fax:**

Signed: | **Received by:** KM | **Date & Time:** 9/7/18/1400

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 195235

Client Details

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

Sample Details

Your Reference	**72505.14, Randwick Campus Development**
Number of Samples	21 Soil
Date samples received	02/07/2018
Date completed instructions received	02/07/2018

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	09/07/2018
Date of Issue	09/07/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Matt Tang
Authorised by Asbestos Approved Signatory: Matt Tang

Results Approved By
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Matthew Tang, Asbsestos Analyst
Nick Sarlamis, Inorganics Supervisor
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	92	93	101	99	97

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	94	96	94	97	95

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	94	92	93	96	95

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		195235-16	195235-17	195235-18	195235-19	195235-20
Your Reference	UNITS	BH213	BH214	BH215	BD1/20180625	Trip Spike
Depth		0.3-0.4	0.1-0.2	0.1-0.2	-	-
Date Sampled		26/06/2018	26/06/2018	29/06/2018	25/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	99%
Ethylbenzene	mg/kg	<1	<1	<1	<1	100%
m+p-xylene	mg/kg	<2	<2	<2	<2	100%
o-Xylene	mg/kg	<1	<1	<1	<1	100%
naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	96	99	93	97	97

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		195235-21
Your Reference	UNITS	Trip Blank
Depth		-
Date Sampled		26/06/2018
Type of sample		Soil
Date extracted	-	03/07/2018
Date analysed	-	04/07/2018
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
Surrogate aaa-Trifluorotoluene	%	96

svTRH (C10-C40) in Soil						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
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	%	112	113	110	112	113

svTRH (C10-C40) in Soil						
Our Reference		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
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	120	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	120	<50
Surrogate o-Terphenyl	%	111	114	113	113	113

svTRH (C10-C40) in Soil						
Our Reference		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	110	<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	160	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	160	<50	<50	<50	<50
Surrogate o-Terphenyl	%	114	112	110	113	112

svTRH (C10-C40) in Soil					
Our Reference		195235-16	195235-17	195235-18	195235-19
Your Reference	UNITS	BH213	BH214	BH215	BD1/20180625
Depth		0.3-0.4	0.1-0.2	0.1-0.2	-
Date Sampled		26/06/2018	26/06/2018	29/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	120	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	120	<50
Surrogate o-Terphenyl	%	110	111	115	114

PAHs in Soil						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	0.2	0.2	<0.1	0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.8	1.0	<0.1	0.2	1.1
Pyrene	mg/kg	0.9	1.1	<0.1	0.2	1.3
Benzo(a)anthracene	mg/kg	0.6	0.7	<0.1	0.1	0.9
Chrysene	mg/kg	0.6	0.8	<0.1	0.1	0.9
Benzo(b,j+k)fluoranthene	mg/kg	1	1	<0.2	0.4	2.2
Benzo(a)pyrene	mg/kg	0.83	0.80	<0.05	0.2	1.3
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6	0.4	<0.1	0.2	0.9
Dibenzo(a,h)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Benzo(g,h,i)perylene	mg/kg	0.8	0.5	<0.1	0.3	1.2
Total +ve PAH's	mg/kg	6.9	7.0	<0.05	1.6	10
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.3	1.1	<0.5	<0.5	2.0
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.3	1.1	<0.5	<0.5	2.0
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.3	1.2	<0.5	<0.5	2.0
Surrogate p-Terphenyl-d14	%	106	106	103	107	109

PAHs in Soil						
Our Reference		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Naphthalene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.2	0.2	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.7	2.7	2.4	0.8	0.3
Anthracene	mg/kg	0.1	0.4	0.4	0.1	<0.1
Fluoranthene	mg/kg	2.4	3.3	5.9	2.1	0.8
Pyrene	mg/kg	2.6	3.1	5.6	2.2	0.9
Benzo(a)anthracene	mg/kg	1.4	1.4	3.1	1.1	0.4
Chrysene	mg/kg	1.6	1.4	2.8	1.2	0.6
Benzo(b,j+k)fluoranthene	mg/kg	2.8	2	4.6	2.2	1
Benzo(a)pyrene	mg/kg	1.7	1.2	2.9	1.4	0.57
Indeno(1,2,3-c,d)pyrene	mg/kg	1.0	0.6	1.5	0.8	0.4
Dibenzo(a,h)anthracene	mg/kg	0.3	0.2	0.4	0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	1.3	0.7	1.7	1.1	0.5
Total +ve PAH's	mg/kg	16	17	31	13	5.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	2.5	1.7	4.3	2.0	0.8
Benzo(a)pyrene TEQ calc(half)	mg/kg	2.5	1.7	4.3	2.0	0.8
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	2.5	1.7	4.3	2.0	0.9
Surrogate p-Terphenyl-d14	%	103	106	104	105	105

PAHs in Soil						
Our Reference		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.2	<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	1.1	0.1	0.2	<0.1	0.3
Anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	2.8	0.4	0.5	<0.1	0.6
Pyrene	mg/kg	3.1	0.4	0.5	<0.1	0.7
Benzo(a)anthracene	mg/kg	1.7	0.2	0.3	<0.1	0.3
Chrysene	mg/kg	1.6	0.2	0.3	<0.1	0.4
Benzo(b,j+k)fluoranthene	mg/kg	2.6	0.4	0.5	<0.2	0.5
Benzo(a)pyrene	mg/kg	1.5	0.2	0.3	<0.05	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	0.6	0.1	0.2	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.7	0.2	0.3	<0.1	0.3
Total +ve PAH's	mg/kg	16	2.4	3.1	<0.05	3.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	2.2	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	2.2	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	2.2	<0.5	0.5	<0.5	0.5
Surrogate p-Terphenyl-d14	%	100	102	104	104	105

PAHs in Soil					
Our Reference		195235-16	195235-17	195235-18	195235-19
Your Reference	UNITS	BH213	BH214	BH215	BD1/20180625
Depth		0.3-0.4	0.1-0.2	0.1-0.2	-
Date Sampled		26/06/2018	26/06/2018	29/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	1.4	0.2
Anthracene	mg/kg	<0.1	<0.1	0.3	<0.1
Fluoranthene	mg/kg	0.4	<0.1	4.8	1
Pyrene	mg/kg	0.4	<0.1	5.1	1.1
Benzo(a)anthracene	mg/kg	0.2	<0.1	2.8	0.7
Chrysene	mg/kg	0.2	<0.1	2.6	0.8
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	4.6	2.0
Benzo(a)pyrene	mg/kg	0.2	0.07	3.2	1.2
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	1.4	0.7
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.3	0.2
Benzo(g,h,i)perylene	mg/kg	0.2	0.1	1.6	0.9
Total +ve PAH's	mg/kg	2.2	0.2	28	8.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	4.5	1.7
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	4.5	1.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	4.5	1.7
Surrogate p-Terphenyl-d14	%	103	81	101	101

Organochlorine Pesticides in soil						
Our Reference		195235-1	195235-2	195235-4	195235-5	195235-6
Your Reference	UNITS	BH201	BH202	BH204	BH205	BH206
Depth		0.2-0.3	0.3-0.4	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		26/06/2018	26/06/2018	27/06/2018	25/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	115	119	118	117	112

Organochlorine Pesticides in soil						
Our Reference		195235-7	195235-8	195235-10	195235-11	195235-12
Your Reference	UNITS	BH207	BH208	BH209	BH210	BH211
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.2-0.3	0.1-0.2
Date Sampled		25/06/2018	25/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	0.4	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	0.3	<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	0.6	0.1	<0.1	<0.1
Surrogate TCMX	%	115	116	115	112	116

Organochlorine Pesticides in soil					
Our Reference		195235-14	195235-16	195235-17	195235-18
Your Reference	UNITS	BH212	BH213	BH214	BH215
Depth		0.4-0.5	0.3-0.4	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	0.2
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	0.2
Surrogate TCMX	%	116	112	113	113

Organophosphorus Pesticides						
Our Reference		195235-1	195235-2	195235-4	195235-5	195235-6
Your Reference	UNITS	BH201	BH202	BH204	BH205	BH206
Depth		0.2-0.3	0.3-0.4	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		26/06/2018	26/06/2018	27/06/2018	25/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	115	119	118	117	112

Organophosphorus Pesticides						
Our Reference		195235-7	195235-8	195235-10	195235-11	195235-12
Your Reference	UNITS	BH207	BH208	BH209	BH210	BH211
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.2-0.3	0.1-0.2
Date Sampled		25/06/2018	25/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
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	%	115	116	115	112	116

Organophosphorus Pesticides					
Our Reference		195235-14	195235-16	195235-17	195235-18
Your Reference	UNITS	BH212	BH213	BH214	BH215
Depth		0.4-0.5	0.3-0.4	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	116	112	113	113

PCBs in Soil						
Our Reference		195235-1	195235-2	195235-4	195235-5	195235-6
Your Reference	UNITS	BH201	BH202	BH204	BH205	BH206
Depth		0.2-0.3	0.3-0.4	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		26/06/2018	26/06/2018	27/06/2018	25/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Aroclor 1254	mg/kg	<0.1	<0.1	0.4	<0.1	1.6
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	0.4	<0.1	1.6
Surrogate TCLMX	%	115	119	118	117	112

PCBs in Soil						
Our Reference		195235-7	195235-8	195235-10	195235-11	195235-12
Your Reference	UNITS	BH207	BH208	BH209	BH210	BH211
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.2-0.3	0.1-0.2
Date Sampled		25/06/2018	25/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Aroclor 1016	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1221	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1232	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1242	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1248	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1254	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Aroclor 1260	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.5	<0.2	<0.5	<0.1
Surrogate TCLMX	%	115	116	115	112	116

PCBs in Soil					
Our Reference		195235-14	195235-16	195235-17	195235-18
Your Reference	UNITS	BH212	BH213	BH214	BH215
Depth		0.4-0.5	0.3-0.4	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	116	112	113	113

Acid Extractable metals in soil						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	3	<1	2	3
Copper	mg/kg	17	12	4	7	11
Lead	mg/kg	130	110	16	30	67
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	2	<1	1	2
Zinc	mg/kg	88	81	51	26	52

Acid Extractable metals in soil						
Our Reference		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Arsenic	mg/kg	<4	<4	7	<4	<4
Cadmium	mg/kg	<0.4	<0.4	0.6	0.5	<0.4
Chromium	mg/kg	4	4	7	9	5
Copper	mg/kg	13	12	85	32	19
Lead	mg/kg	140	98	270	350	180
Mercury	mg/kg	0.1	<0.1	0.2	0.1	<0.1
Nickel	mg/kg	2	2	3	4	2
Zinc	mg/kg	49	93	160	130	84

Acid Extractable metals in soil						
Our Reference		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	1	0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	8	5	2	4
Copper	mg/kg	35	29	20	1	25
Lead	mg/kg	130	130	130	4	150
Mercury	mg/kg	0.1	0.2	0.3	<0.1	0.2
Nickel	mg/kg	3	5	3	1	2
Zinc	mg/kg	150	160	140	9	300

Acid Extractable metals in soil					
Our Reference		195235-16	195235-17	195235-18	195235-19
Your Reference	UNITS	BH213	BH214	BH215	BD1/20180625
Depth		0.3-0.4	0.1-0.2	0.1-0.2	-
Date Sampled		26/06/2018	26/06/2018	29/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	4	3	6	4
Copper	mg/kg	23	4	21	29
Lead	mg/kg	130	29	190	140
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	1	4	3
Zinc	mg/kg	170	15	56	88

Misc Soil - Inorg						
Our Reference		195235-1	195235-2	195235-4	195235-5	195235-6
Your Reference	UNITS	BH201	BH202	BH204	BH205	BH206
Depth		0.2-0.3	0.3-0.4	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		26/06/2018	26/06/2018	27/06/2018	25/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg						
Our Reference		195235-7	195235-8	195235-10	195235-11	195235-12
Your Reference	UNITS	BH207	BH208	BH209	BH210	BH211
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.2-0.3	0.1-0.2
Date Sampled		25/06/2018	25/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg					
Our Reference		195235-14	195235-16	195235-17	195235-18
Your Reference	UNITS	BH212	BH213	BH214	BH215
Depth		0.4-0.5	0.3-0.4	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5

Misc Inorg - Soil					
Our Reference		195235-1	195235-11	195235-17	195235-18
Your Reference	UNITS	BH201	BH210	BH214	BH215
Depth		0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
pH 1:5 soil:water	pH Units	5.9	6.3	6.3	6.6

Moisture						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Moisture	%	6.8	5.1	8.2	1.6	3.0

Moisture						
Our Reference		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Moisture	%	8.7	4.9	6.0	11	5.8

Moisture						
Our Reference		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Moisture	%	7.2	10	11	1.9	4.9

Moisture					
Our Reference		195235-16	195235-17	195235-18	195235-19
Your Reference	UNITS	BH213	BH214	BH215	BD1/20180625
Depth		0.3-0.4	0.1-0.2	0.1-0.2	-
Date Sampled		26/06/2018	26/06/2018	29/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/07/2018	03/07/2018	03/07/2018	03/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Moisture	%	6.0	1.9	3.6	2.6

Asbestos ID - soils						
Our Reference		195235-1	195235-2	195235-3	195235-4	195235-5
Your Reference	UNITS	BH201	BH202	BH202	BH204	BH205
Depth		0.2-0.3	0.3-0.4	0.9-1.0	0.3-0.4	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	27/06/2018	25/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Sample mass tested	g	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 35g	Approx. 35g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/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		195235-6	195235-7	195235-8	195235-9	195235-10
Your Reference	UNITS	BH206	BH207	BH208	BH209	BH209
Depth		0.3-0.4	0.1-0.2	0.3-0.4	0.1-0.2	0.3-0.4
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Sample mass tested	g	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 25g	Approx. 30g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/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		195235-11	195235-12	195235-13	195235-14	195235-15
Your Reference	UNITS	BH210	BH211	BH211	BH212	BH213
Depth		0.2-0.3	0.1-0.2	0.4-0.5	0.4-0.5	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	06/07/2018	06/07/2018	06/07/2018	06/07/2018	06/07/2018
Sample mass tested	g	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 35g	Approx. 30g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Beige sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected Synthetic mineral fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/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		195235-16	195235-17	195235-18
Your Reference	UNITS	BH213	BH214	BH215
Depth		0.3-0.4	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil
Date analysed	-	06/07/2018	06/07/2018	06/07/2018
Sample mass tested	g	Approx. 30g	Approx. 35g	Approx. 35g
Sample Description	-	Brown sandy soil	Beige sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

CEC					
Our Reference		195235-1	195235-11	195235-17	195235-18
Your Reference	UNITS	BH201	BH210	BH214	BH215
Depth		0.2-0.3	0.2-0.3	0.1-0.2	0.1-0.2
Date Sampled		26/06/2018	26/06/2018	26/06/2018	29/06/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Date analysed	-	04/07/2018	04/07/2018	04/07/2018	04/07/2018
Exchangeable Ca	meq/100g	0.6	1.8	0.7	2.4
Exchangeable K	meq/100g	<0.1	<0.1	<0.1	0.1
Exchangeable Mg	meq/100g	0.11	0.19	<0.1	0.48
Exchangeable Na	meq/100g	<0.1	<0.1	<0.1	<0.1
Cation Exchange Capacity	meq/100g	<1	2.0	<1	3.1

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-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-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			04/07/2018	1	04/07/2018	04/07/2018		04/07/2018	04/07/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	92	91
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	92	91
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	92	91
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	89	88
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	87	86
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	97	96
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	87	86
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	97	1	92	95	3	97	94

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	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[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	94	98	4	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	103	116
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	83	106
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	82
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	103	116
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	83	106
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	92	82
Surrogate o-Terphenyl	%		Org-003	70	1	112	112	0	112	113

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	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[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	110	<100	10	[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	160	<100	46	[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	114	113	1	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			04/07/2018	1	04/07/2018	04/07/2018		04/07/2018	04/07/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	103	102
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	100	100
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.2	0	101	97
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	0.8	0.7	13	100	91
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.9	0.8	12	105	95
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.6	0.5	18	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.6	0.6	0	104	97
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	1	1	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.83	0.80	4	91	82
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.6	0.5	18	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.1	67	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	0.8	0.7	13	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	108	1	106	105	1	123	121

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[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	0.2	0.2	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	1.1	1.2	9	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	11	2.8	2.9	4	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	11	3.1	3.3	6	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	11	1.7	1.8	6	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	11	1.6	1.7	6	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	11	2.6	2.7	4	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	11	1.5	1.6	6	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	11	0.6	0.6	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	11	0.2	0.2	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	11	0.7	0.7	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	11	100	101	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			04/07/2018	1	04/07/2018	04/07/2018		04/07/2018	04/07/2018
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	93
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	88	86
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	93	90
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	94	92
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	92	95
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	101	99
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	108	105
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	94	91
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	99	97
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	110	107
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	116	1	115	117	2	110	108

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[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	112	113	1	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			04/07/2018	1	04/07/2018	04/07/2018		04/07/2018	04/07/2018
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	93	91
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	88	93
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	92	89
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	102	95
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	83	82
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	105	97
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	102	100
Surrogate TCMX	%		Org-008	116	1	115	117	2	116	115

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[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	112	113	1	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date extracted	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			04/07/2018	1	04/07/2018	04/07/2018		04/07/2018	04/07/2018
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	104	107
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	116	1	115	117	2	116	115

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	6	03/07/2018	06/07/2018		[NT]	[NT]
Date analysed	-			[NT]	6	04/07/2018	07/07/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	6	1.6	1.9	17	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	6	<1	<1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	6	112	85	27	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	04/07/2018	04/07/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	11	<0.5	<0.5	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	11	112	113	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date prepared	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Arsenic	mg/kg	4	Metals-020	<4	1	<4	<4	0	116	112
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	112	119
Chromium	mg/kg	1	Metals-020	<1	1	4	3	29	116	117
Copper	mg/kg	1	Metals-020	<1	1	17	16	6	114	122
Lead	mg/kg	1	Metals-020	<1	1	130	130	0	119	149
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	116	120
Nickel	mg/kg	1	Metals-020	<1	1	3	3	0	113	119
Zinc	mg/kg	1	Metals-020	<1	1	88	75	16	115	147

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	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	11	<4	<4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	11	1	1	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	11	5	7	33	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	11	35	45	25	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	11	130	150	14	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	11	0.1	0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	11	3	4	29	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	11	150	180	18	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	195235-2
Date prepared	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Date analysed	-			03/07/2018	1	03/07/2018	03/07/2018		03/07/2018	03/07/2018
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	102	102

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Date analysed	-			[NT]	11	03/07/2018	03/07/2018		[NT]	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	[NT]	11	<5	<5	0	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			04/07/2018	[NT]	[NT]	[NT]	[NT]	04/07/2018	[NT]
Date analysed	-			04/07/2018	[NT]	[NT]	[NT]	[NT]	04/07/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			04/07/2018	18	04/07/2018	04/07/2018		04/07/2018	[NT]
Date analysed	-			04/07/2018	18	04/07/2018	04/07/2018		04/07/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	18	2.4	2.4	0	98	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	18	0.1	0.1	0	104	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	18	0.48	0.48	0	100	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	18	<0.1	<0.1	0	94	[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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

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

PCBs in Soil - PQL has been raised due to interference from analytes (other than those being tested) in samples 6,8,10 and 11.

Acid Extractable Metals in Soil - Spike recovery for Pb and Zn in sample #2 at 149% and 147% respectively which is outside lab acceptance criteria (70-130%), however, the LCS recovery is acceptable at 119% and 115%, sample heterogeneity suspected.

Asbestos: A portion of the supplied sample was 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 195235-1-18 were sub-sampled from jars provided by the client.

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	72505.14	**Suburb:**	Randwick	**To:**	EnviroLab
Project Name:	Randwick Campus Development	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Paul Gorman	**Sampler:**	Joel J-H/Nicola W	**Attn:**	Aileen Hie
Emails:	paul.gorman@douglaspartners.com.au; joel.james-hall@douglaspartners.com			**Phone:**	(02) 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 (S - soil, W - water)	Container Type (G, P)	Analytes: Combo 8a	Combo 3a	Combo 3	BTEX	pH + CEC					Notes/preservation
BH201/0.2-0.3m	1	26/06/18	S	G	x				x					
BH202/0.3-0.4m	2	26/06/18	S	G	x									
BH202/0.9-1.0m	3	26/06/18	S	G		x								
BH204/0.3-0.4m	4	27/06/18	S	G	x									
BH205/0.1-0.2m	5	25/06/18	S	G	x									
BH206/0.3-0.4m	6	25/06/18	S	G	x									
BH207/0.1-0.2m	7	25/06/18	S	G	x									
BH208/0.3-0.4m	8	25/06/18	S	G	x									
BH209/0.1-0.2m	9	26/06/18	S	G		x								
BH209/0.3-0.4m	10	26/06/18	S	G	x									
BH210/0.2-0.3m	11	26/06/18	S	G	x				x					
BH211/0.1-0.2m	12	26/06/18	S	G	x									
BH211/0.4-0.5m	13	26/06/18	S	G		x								
BH212/0.4-0.5m	14	26/06/18	S	G	x									
BH213/0.1-0.2m	15	26/06/18	S	G		x								
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: 195235
Date Received: 02/07/18
Time Received: 12:50
Received By: JC
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: **Relinquished by:** **Transported to laboratory by:**

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: **Received by:** IFLS JE **Date & Time:** 02/07/18 12:50

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	72505.14	**Suburb:**	Randwick	**To:**	EnviroLab
Project Name:	Randwick Campus Development	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Paul Gorman	**Sampler:**	Joel J-H/Nicola W	**Attn:**	Aileen Hie
Emails:	paul.gorman@douglaspartners.com.au; joel.james-hall@douglaspartners.com			**Phone:**	(02) 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 Date	Sample Type (S - soil, W - water)	Container Type (G, P)	Analytes: Combo 8a	Combo 3a	Combo 3	BTEX	pH + CEC					Notes/preservation
BH213/0.3-0.4m	16	26/06/18	S	G	x									
BH214/0.1-0.2m	17	26/06/18	S	G	x				x					
BH215/0.1-0.2m	18	29/06/18	S	G	x				x					
BD1/20180625	19	25/06/18	S	G			x							Intra-lab sample
BD2/20180626	–	26/06/18	S	G			x							Inter-lab sample
Trip spike/blank	20, 21							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: 195235

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

Send Results to: Douglas Partners Pty Ltd | **Address:** | **Phone:** | **Fax:**

Signed: | **Received by:** EL S JE | **Date & Time:** 02/07/18 12:50

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 195235-A

Client Details

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

Sample Details

Your Reference	**72505.14, Randwick Campus Development**
Number of Samples	Additional Testing on 6 Soils
Date samples received	02/07/2018
Date completed instructions received	10/07/2018

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	17/07/2018
Date of Issue	17/07/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Matt Tang
Authorised by Asbestos Approved Signatory: Matt Tang

Results Approved By
Dragana Tomas, Senior Chemist
Leon Ow, Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

Metals in TCLP USEPA1311						
Our Reference		195235-A-5	195235-A-6	195235-A-8	195235-A-9	195235-A-11
Your Reference	UNITS	BH205	BH206	BH208	BH209	BH210
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.1-0.2	0.2-0.3
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/07/2018	13/07/2018	13/07/2018	13/07/2018	13/07/2018
Date analysed	-	[NA]	13/07/2018	13/07/2018	13/07/2018	13/07/2018
pH of soil for fluid# determ.	pH units	6.5	6.9	7.1	6.0	6.3
pH of soil TCLP (after HCl)	pH units	1.5	1.6	1.6	1.6	1.5
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	4.9	5.0	5.0	5.0	5.0
Lead in TCLP	mg/L	[NA]	0.1	0.38	0.1	0.1

Metals in TCLP USEPA1311		
Our Reference		195235-A-18
Your Reference	UNITS	BH215
Depth		0.1-0.2
Date Sampled		29/06/2018
Type of sample		Soil
Date extracted	-	13/07/2018
Date analysed	-	13/07/2018
pH of soil for fluid# determ.	pH units	6.4
pH of soil TCLP (after HCl)	pH units	1.6
Extraction fluid used	-	1
pH of final Leachate	pH units	5.0
Lead in TCLP	mg/L	0.2

PAHs in TCLP (USEPA 1311)						
Our Reference		195235-A-5	195235-A-6	195235-A-8	195235-A-9	195235-A-11
Your Reference	UNITS	BH205	BH206	BH208	BH209	BH210
Depth		0.1-0.2	0.3-0.4	0.3-0.4	0.1-0.2	0.2-0.3
Date Sampled		25/06/2018	25/06/2018	25/06/2018	26/06/2018	26/06/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	13/07/2018	12/07/2018	12/07/2018	12/07/2018	12/07/2018
Date analysed	-	16/07/2018	13/07/2018	13/07/2018	13/07/2018	13/07/2018
Naphthalene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Acenaphthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluorene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Phenanthrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Fluoranthene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chrysene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Total +ve PAH's	mg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	96	103	102	92	107

PAHs in TCLP (USEPA 1311)		
Our Reference		195235-A-18
Your Reference	UNITS	BH215
Depth		0.1-0.2
Date Sampled		29/06/2018
Type of sample		Soil
Date extracted	-	12/07/2018
Date analysed	-	13/07/2018
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	%	89

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.
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: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	195235-A-8
Date extracted	-			13/07/2018	6	13/07/2018	13/07/2018		13/07/2018	13/07/2018
Date analysed	-			13/07/2018	6	13/07/2018	13/07/2018		13/07/2018	13/07/2018
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	6	0.1	0.1	0	101	97

QUALITY CONTROL: PAHs in TCLP (USEPA 1311)					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			13/07/2018	[NT]	[NT]	[NT]	[NT]	13/07/2018	[NT]
Date analysed	-			16/07/2018	[NT]	[NT]	[NT]	[NT]	16/07/2018	[NT]
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	111	[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]	110	[NT]
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	104	[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]	103	[NT]
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NT]	[NT]	108	[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]	102	[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]	108	[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	107	[NT]	[NT]	[NT]	[NT]	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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

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.

Aileen Hie

From: Ken Nguyen
Sent: Tuesday, 10 July 2018 1:52 PM
To: Aileen Hie
Subject: FW: Results for Registration 195235 72505.14, Randwick Campus Development

Envirolab Ref: 195235A
Due: 17/7/18
Std 10.

Regards,

Ken Nguyen | Chemist | Envirolab Services Pty Ltd
(Monday to Friday 1pm to 9pm)

Great Science, Great Service.

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

From: Paul Gorman [mailto:Paul.Gorman@douglaspartners.com.au]
Sent: Tuesday, 10 July 2018 9:08 AM
To: Ken Nguyen <KNguyen@envirolab.com.au>; Joel James-Hall <joel.james-hall@douglaspartners.com.au>
Subject: RE: Results for Registration 195235 72505.14, Randwick Campus Development

Hi Ken,

Can you please run TCLP testing on standard turnaround on the following samples:

5	BH205/0.1-0.2	PAH
6	BH206/0.3-0.4	PAH, lead
8	BH208/0.3-0.4	PAH, lead
11	BH210/0.2-0.3	PAH, lead
9	BH209/0.1-0.2	PAH, lead
18	BH215/0.1-0.2	PAH, lead

Regards

Paul Gorman | Principal / Environmental Manager
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.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 198208

Client Details

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

Sample Details

Your Reference	**72505.14, Randwick**
Number of Samples	27 soil, 2 material
Date samples received	10/08/2018
Date completed instructions received	10/08/2018

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	17/08/2018
Date of Issue	16/08/2018

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

Results Approved By
Jeremy Faircloth, Organics Supervisor
Ken Nguyen, Senior Chemist
Lucy Zhu, Asbsestos Analyst
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		198208-12	198208-13	198208-14	198208-17	198208-18
Your Reference	UNITS	TP6	BD1/20180808	TP6	TP8	TP8
Depth		0.4-0.5	-	1.4-1.5	0.5-0.6	1.3-1.4
Date Sampled		08/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
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	%	88	91	85	110	87

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		198208-19	198208-28	198208-29
Your Reference	UNITS	TP9	Trip Spike	Trip Blank
Depth		0-0.1	-	-
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
TRH C_6 - C_9	mg/kg	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]	<25
Benzene	mg/kg	<0.2	90%	<0.2
Toluene	mg/kg	<0.5	93%	<0.5
Ethylbenzene	mg/kg	<1	90%	<1
m+p-xylene	mg/kg	<2	83%	<2
o-Xylene	mg/kg	<1	99%	<1
naphthalene	mg/kg	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<1	[NA]	<1
Surrogate aaa-Trifluorotoluene	%	101	98%	102

svTRH (C10-C40) in Soil						
Our Reference		198208-12	198208-13	198208-14	198208-17	198208-18
Your Reference	UNITS	TP6	BD1/20180808	TP6	TP8	TP8
Depth		0.4-0.5	-	1.4-1.5	0.5-0.6	1.3-1.4
Date Sampled		08/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
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	%	95	94	94	93	87

svTRH (C10-C40) in Soil		
Our Reference		198208-19
Your Reference	UNITS	TP9
Depth		0-0.1
Date Sampled		08/08/2018
Type of sample		soil
Date extracted	-	13/08/2018
Date analysed	-	14/08/2018
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	88

PAHs in Soil						
Our Reference		198208-1	198208-2	198208-3	198208-4	198208-5
Your Reference	UNITS	TP1	TP1	TP2	TP2	TP3
Depth		0.3-0.4	1.1-1.2	0-0.1	1.3-1.4	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	0.2	<0.1	<0.1
Pyrene	mg/kg	0.2	<0.1	0.2	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.2	<0.1	0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	0.3	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	0.1	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	1.4	<0.05	1.0	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	99	112	98	95	98

PAHs in Soil						
Our Reference		198208-6	198208-7	198208-8	198208-9	198208-10
Your Reference	UNITS	TP3	TP4	BD2/20180807	TP4	TP5
Depth		1.0-1.1	0.4-0.5	-	0.6-0.47	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.2	<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	1.8	0.2	<0.1	0.2
Anthracene	mg/kg	<0.1	0.4	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	3.4	0.6	<0.1	0.8
Pyrene	mg/kg	<0.1	3.1	0.6	<0.1	0.9
Benzo(a)anthracene	mg/kg	<0.1	1.5	0.3	<0.1	0.5
Chrysene	mg/kg	<0.1	1.5	0.4	<0.1	0.6
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	2.6	0.7	<0.2	1
Benzo(a)pyrene	mg/kg	<0.05	1.5	0.4	<0.05	0.63
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.8	0.2	<0.1	0.4
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.9	0.3	<0.1	0.5
Total +ve PAH's	mg/kg	<0.05	18	3.9	<0.05	5.6
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	2.1	<0.5	<0.5	0.8
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	2.1	0.5	<0.5	0.9
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	2.1	0.6	<0.5	0.9
Surrogate p-Terphenyl-d14	%	89	96	98	90	98

PAHs in Soil						
Our Reference		198208-11	198208-12	198208-13	198208-14	198208-15
Your Reference	UNITS	TP5	TP6	BD1/20180808	TP6	TP7
Depth		0.9-1.0	0.4-0.5	-	1.4-1.5	0.3-0.4
Date Sampled		07/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
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	0.2	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	<0.1	<0.1	0.2
Pyrene	mg/kg	<0.1	0.4	<0.1	<0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.2	<0.1	<0.1	0.2
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.4	<0.2	<0.2	0.3
Benzo(a)pyrene	mg/kg	<0.05	0.2	<0.05	<0.05	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.1	<0.1	<0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	<0.1	<0.1	0.2
Total +ve PAH's	mg/kg	<0.05	2.1	<0.05	<0.05	1.2
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	%	96	95	97	96	93

PAHs in Soil						
Our Reference		198208-16	198208-17	198208-18	198208-19	198208-22
Your Reference	UNITS	TP7	TP8	TP8	TP9	TP10
Depth		0.7-0.8	0.5-0.6	1.3-1.4	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
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	0.3	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	1.3	0.3
Pyrene	mg/kg	<0.1	<0.1	<0.1	1.4	0.4
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.8	0.2
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.9	0.3
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	2.1	0.6
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	1.2	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.8	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	1.0	0.3
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	10	2.5
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	1.7	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	1.7	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	1.7	0.5
Surrogate p-Terphenyl-d14	%	88	95	91	99	98

PAHs in Soil				
Our Reference		198208-23	198208-26	198208-27
Your Reference	UNITS	TP10	TP11	TP11
Depth		0.9-1.0	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.3	<0.1
Pyrene	mg/kg	<0.1	0.3	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.1	<0.1
Chrysene	mg/kg	<0.1	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.4	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.2	<0.1
Total +ve PAH's	mg/kg	<0.05	2.2	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	99	99	94

Organochlorine Pesticides in soil				
Our Reference		198208-12	198208-17	198208-19
Your Reference	UNITS	TP6	TP8	TP9
Depth		0.4-0.5	0.5-0.6	0-0.1
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	1.6
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	104	105	103

Organophosphorus Pesticides				
Our Reference		198208-12	198208-17	198208-19
Your Reference	UNITS	TP6	TP8	TP9
Depth		0.4-0.5	0.5-0.6	0-0.1
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	104	105	103

PCBs in Soil				
Our Reference		198208-12	198208-17	198208-19
Your Reference	UNITS	TP6	TP8	TP9
Depth		0.4-0.5	0.5-0.6	0-0.1
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date extracted	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	104	105	103

Acid Extractable metals in soil						
Our Reference		198208-1	198208-2	198208-3	198208-4	198208-5
Your Reference	UNITS	TP1	TP1	TP2	TP2	TP3
Depth		0.3-0.4	1.1-1.2	0-0.1	1.3-1.4	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Lead	mg/kg	47	1	91	<1	22

Acid Extractable metals in soil						
Our Reference		198208-6	198208-7	198208-8	198208-9	198208-10
Your Reference	UNITS	TP3	TP4	BD2/20180807	TP4	TP5
Depth		1.0-1.1	0.4-0.5	-	0.6-0.47	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Lead	mg/kg	<1	180	220	<1	140

Acid Extractable metals in soil						
Our Reference		198208-11	198208-12	198208-13	198208-14	198208-15
Your Reference	UNITS	TP5	TP6	BD1/20180808	TP6	TP7
Depth		0.9-1.0	0.4-0.5	-	1.4-1.5	0.3-0.4
Date Sampled		07/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Arsenic	mg/kg	[NA]	<4	<4	<4	[NA]
Cadmium	mg/kg	[NA]	<0.4	<0.4	<0.4	[NA]
Chromium	mg/kg	[NA]	2	1	2	[NA]
Copper	mg/kg	[NA]	13	12	<1	[NA]
Lead	mg/kg	14	91	55	2	20
Mercury	mg/kg	[NA]	0.1	0.1	<0.1	[NA]
Nickel	mg/kg	[NA]	<1	<1	<1	[NA]
Zinc	mg/kg	[NA]	27	24	11	[NA]

Acid Extractable metals in soil						
Our Reference		198208-16	198208-17	198208-18	198208-19	198208-22
Your Reference	UNITS	TP7	TP8	TP8	TP9	TP10
Depth		0.7-0.8	0.5-0.6	1.3-1.4	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Arsenic	mg/kg	[NA]	<4	<4	<4	[NA]
Cadmium	mg/kg	[NA]	<0.4	<0.4	<0.4	[NA]
Chromium	mg/kg	[NA]	<1	2	8	[NA]
Copper	mg/kg	[NA]	4	<1	37	[NA]
Lead	mg/kg	<1	19	2	890	110
Mercury	mg/kg	[NA]	0.4	<0.1	0.2	[NA]
Nickel	mg/kg	[NA]	<1	<1	4	[NA]
Zinc	mg/kg	[NA]	26	22	200	[NA]

Acid Extractable metals in soil				
Our Reference		198208-23	198208-26	198208-27
Your Reference	UNITS	TP10	TP11	TP11
Depth		0.9-1.0	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018
Lead	mg/kg	2	180	3

Misc Soil - Inorg				
Our Reference		198208-12	198208-17	198208-19
Your Reference	UNITS	TP6	TP8	TP9
Depth		0.4-0.5	0.5-0.6	0-0.1
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	13/08/2018	13/08/2018	13/08/2018
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5

Moisture						
Our Reference		198208-1	198208-2	198208-3	198208-4	198208-5
Your Reference	UNITS	TP1	TP1	TP2	TP2	TP3
Depth		0.3-0.4	1.1-1.2	0-0.1	1.3-1.4	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Moisture	%	1.5	2.6	3.0	2.2	2.0

Moisture						
Our Reference		198208-6	198208-7	198208-8	198208-9	198208-10
Your Reference	UNITS	TP3	TP4	BD2/20180807	TP4	TP5
Depth		1.0-1.1	0.4-0.5	-	0.6-0.47	0.1-0.2
Date Sampled		07/08/2018	07/08/2018	07/08/2018	07/08/2018	07/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Moisture	%	1.9	10	11	2.8	2.9

Moisture						
Our Reference		198208-11	198208-12	198208-13	198208-14	198208-15
Your Reference	UNITS	TP5	TP6	BD1/20180808	TP6	TP7
Depth		0.9-1.0	0.4-0.5	-	1.4-1.5	0.3-0.4
Date Sampled		07/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Moisture	%	2.9	2.4	3.8	2.9	1.3

Moisture						
Our Reference		198208-16	198208-17	198208-18	198208-19	198208-22
Your Reference	UNITS	TP7	TP8	TP8	TP9	TP10
Depth		0.7-0.8	0.5-0.6	1.3-1.4	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018	14/08/2018	14/08/2018
Moisture	%	2.3	4.1	8.3	9.7	5.9

Moisture				
Our Reference		198208-23	198208-26	198208-27
Your Reference	UNITS	TP10	TP11	TP11
Depth		0.9-1.0	0-0.1	0.4-0.5
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date prepared	-	13/08/2018	13/08/2018	13/08/2018
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
Moisture	%	3.3	2.2	2.1

Asbestos ID - soils				
Our Reference		198208-12	198208-17	198208-19
Your Reference	UNITS	TP6	TP8	TP9
Depth		0.4-0.5	0.5-0.6	0-0.1
Date Sampled		08/08/2018	08/08/2018	08/08/2018
Type of sample		soil	soil	soil
Date analysed	-	14/08/2018	14/08/2018	14/08/2018
Sample mass tested	g	Approx. 30g	Approx. 35g	Approx. 30g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil
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

Asbestos ID - materials			
Our Reference		198208-21	198208-25
Your Reference	UNITS	TP9	TP10
Depth		0.4-0.5A	0-0.1A
Date Sampled		08/08/2018	08/08/2018
Type of sample		material	material
Date analysed	-	14/08/2018	14/08/2018
Mass / Dimension of Sample	-	153x70x5mm	135x70x5mm
Sample Description	-	Grey compressed fibre cement material	Grey compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected

Asbestos ID - soils NEPM			
Our Reference		198208-20	198208-24
Your Reference	UNITS	TP9	TP10
Depth		0.4-0.5	0-0.1
Date Sampled		08/08/2018	08/08/2018
Type of sample		soil	soil
Date analysed	-	16/08/2018	16/08/2018
Sample mass tested	g	1,068.23	1,212.14
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	Chrysotile Amosite Crocidolite	No visible asbestos detected
ACM >7mm Estimation*	g	0.0603	–
FA and AF Estimation*	g	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Metals-020	Determination of various metals by ICP-AES.
Metals-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.

Method ID	Methodology Summary
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.
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-9	198208-19
Date extracted	-			13/08/2018	12	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Date analysed	-			14/08/2018	12	14/08/2018	14/08/2018		14/08/2018	14/08/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	12	<25	<25	0	88	95
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	12	<25	<25	0	88	95
Benzene	mg/kg	0.2	Org-016	<0.2	12	<0.2	<0.2	0	89	91
Toluene	mg/kg	0.5	Org-016	<0.5	12	<0.5	<0.5	0	89	77
Ethylbenzene	mg/kg	1	Org-016	<1	12	<1	<1	0	97	103
m+p-xylene	mg/kg	2	Org-016	<2	12	<2	<2	0	83	103
o-Xylene	mg/kg	1	Org-016	<1	12	<1	<1	0	75	101
naphthalene	mg/kg	1	Org-014	<1	12	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	12	88	102	15	100	110

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	198208-19
Date extracted	-			13/08/2018	12	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Date analysed	-			14/08/2018	12	14/08/2018	14/08/2018		14/08/2018	14/08/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	12	<50	<50	0	130	107
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	12	<100	<100	0	121	108
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	12	<100	<100	0	108	112
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	12	<50	<50	0	130	107
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	12	<100	<100	0	121	108
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	12	<100	<100	0	108	112
Surrogate o-Terphenyl	%		Org-003	94	12	95	96	1	101	88

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	198208-2
Date extracted	-			13/08/2018	1	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Date analysed	-			14/08/2018	1	14/08/2018	14/08/2018		14/08/2018	14/08/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	124	107
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	127	108
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	120	115
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	0.2	0.1	67	116	106
Pyrene	mg/kg	0.1	Org-012	<0.1	1	0.2	0.1	67	121	113
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	0.2	<0.1	67	112	118
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	0.3	0.2	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	0.1	0.07	35	115	103
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	0.1	<0.1	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	0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	102	1	99	98	1	127	96

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	198208-19
Date extracted	-			[NT]	12	13/08/2018	13/08/2018		[NT]	13/08/2018
Date analysed	-			[NT]	12	14/08/2018	14/08/2018		[NT]	14/08/2018
Naphthalene	mg/kg	0.1	Org-012	[NT]	12	<0.1	0.2	67	[NT]	108
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	12	<0.1	0.2	67	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	12	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	12	<0.1	0.1	0	[NT]	104
Phenanthrene	mg/kg	0.1	Org-012	[NT]	12	0.2	2.2	167	[NT]	105
Anthracene	mg/kg	0.1	Org-012	[NT]	12	<0.1	0.5	133	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	12	0.4	2.7	148	[NT]	111
Pyrene	mg/kg	0.1	Org-012	[NT]	12	0.4	2.8	150	[NT]	116
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	12	0.2	1.1	138	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	12	0.2	1.3	147	[NT]	105
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	12	0.4	2	133	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	12	0.2	1.1	138	[NT]	107
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	12	0.1	0.5	133	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	12	<0.1	0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	12	0.2	0.6	100	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	12	95	97	2	[NT]	122

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	18	13/08/2018	13/08/2018		[NT]	[NT]
Date analysed	-			[NT]	18	14/08/2018	14/08/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	18	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	18	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	18	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	18	91	99	8	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			13/08/2018	[NT]	[NT]	[NT]	[NT]	13/08/2018	[NT]
Date analysed	-			14/08/2018	[NT]	[NT]	[NT]	[NT]	14/08/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	123	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	101	[NT]	[NT]	[NT]	[NT]	123	[NT]

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			13/08/2018	[NT]	[NT]	[NT]	[NT]	13/08/2018	[NT]
Date analysed	-			14/08/2018	[NT]	[NT]	[NT]	[NT]	14/08/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Surrogate TCMX	%		Org-008	101	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			13/08/2018	[NT]	[NT]	[NT]	[NT]	13/08/2018	[NT]
Date analysed	-			14/08/2018	[NT]	[NT]	[NT]	[NT]	14/08/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	101	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	198208-2
Date prepared	-			13/08/2018	1	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Date analysed	-			13/08/2018	1	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Arsenic	mg/kg	4	Metals-020	<4	12	<4	<4	0	107	98
Cadmium	mg/kg	0.4	Metals-020	<0.4	12	<0.4	<0.4	0	105	105
Chromium	mg/kg	1	Metals-020	<1	12	2	2	0	107	102
Copper	mg/kg	1	Metals-020	<1	12	13	14	7	110	105
Lead	mg/kg	1	Metals-020	<1	1	47	45	4	105	103
Mercury	mg/kg	0.1	Metals-021	<0.1	12	0.1	0.1	0	[NT]	96
Nickel	mg/kg	1	Metals-020	<1	12	<1	<1	0	111	109
Zinc	mg/kg	1	Metals-020	<1	12	27	29	7	104	104

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	198208-19
Date prepared	-			[NT]	12	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Date analysed	-			[NT]	12	13/08/2018	13/08/2018		13/08/2018	13/08/2018
Arsenic	mg/kg	4	Metals-020	[NT]	18	<4	<4	0	109	94
Cadmium	mg/kg	0.4	Metals-020	[NT]	18	<0.4	<0.4	0	106	98
Chromium	mg/kg	1	Metals-020	[NT]	18	2	5	86	109	96
Copper	mg/kg	1	Metals-020	[NT]	18	<1	<1	0	112	102
Lead	mg/kg	1	Metals-020	[NT]	12	91	99	8	106	#
Mercury	mg/kg	0.1	Metals-021	[NT]	18	<0.1	<0.1	0	100	106
Nickel	mg/kg	1	Metals-020	[NT]	18	<1	1	0	112	102
Zinc	mg/kg	1	Metals-020	[NT]	18	22	31	34	106	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	18	13/08/2018	13/08/2018		[NT]	[NT]
Date analysed	-			[NT]	18	13/08/2018	13/08/2018		[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	18	2	2	0	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			13/08/2018	12	13/08/2018	13/08/2018		13/08/2018	[NT]
Date analysed	-			13/08/2018	12	13/08/2018	13/08/2018		13/08/2018	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	12	<5	<5	0	100	[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: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

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 these sub-samples are indicative of the entire sample.
Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples requested for asbestos testing were sub-sampled from jars provided by the client.

PAHs in Soil - The RPD for duplicate results is accepted due to the non homogenous nature of the sample 12.

Acid Extractable Metals in Soil:
Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

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

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	72505.14	**Suburb:** RANDWICK	**To:**
Project Name:	Randwick Campus Redevelopment	**Order Number**	
Project Manager:	PG	**Sampler:** NW	**Attn:**
Emails:	paul.gorman@douglasparrtners.com.au; nicola.warton@douglaspartners.com.au		**Phone:**
Date Required:	Standard ☐		**Email:**
Prior Storage:	☐ Fridge	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 (S - soil, W - water)	Container Type (G - glass, P - plastic)	Analytes: Lead	PAH	Combo 8a	Combo 3		Notes/preservation
✓	TP1/ 0.3-0.4	1	07/08/18	S	G	X	X				
✓	BD1/20180807	2	07/08/18	S	G	X	X				Inter lab
✓	TP1/1.1-1.2	3 2	07/08/18	S	G	X	X				
✓	TP2/ 0-0.1	4 3	07/08/18	S	G	X	X				
✓	TP2/ 1.3-1.4	5 4	07/08/18	S	G	X	X				
✓	TP3/ 0.1-0.2	6 5	07/08/18	S	G	X	X				
✓	TP3/ 1.0-1.1	7 6	07/08/18	S	G	X	X				
✓	TP4/ 0.4-0.5	8 7	07/08/18	S	G	X	X				
✓	BD2/20180807	9 8	07/08/18	S	G	X	X				Intra lab
✓	TP4/0.6-0.7	10 9	07/08/18	S	G	X	X				
✓	TP5/ 0.1-0.2	11 10	07/08/18	S	G	X	X				
✓	TP5/ 0.9-1.0	12 11	07/08/18	S	G	X	X				
✓	TP6/ 0.4-0.5	13 12	08/08/18	S	G			X			
✓	BD1/20180808	14 13	08/08/18	S	G				X		Intra lab
✓	TP6/ 1.4-1.5	15 14	08/08/18	S	G				X		
	PQL (S) mg/kg										**ANZECC PQLs req'd for all water analytes** ☐

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

Job No: 198208
Date Received: 10/8/18
Time Received: 1530
Received By: MT
Temp: Cool/Ambient 14.7
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: 198208

Total number of samples in container:	**Relinquished by:**	**Transported to laboratory by:**
Send Results to: Douglas Partners Pty Ltd	**Address:**	**Phone:** **Fax:**
Signed: NW	**Received by:** MT	**Date & Time:** 10/8/18 1530

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	72505.14	**Suburb:** RANDWICK	**To:**
Project Name:	Randwick Campus Redevelopment	**Order Number**	
Project Manager:	PG	**Sampler:** NW	**Attn:**
Emails:	paul.gorman@douglasparrtners.com.au; nicola.warton@douglaspartners.com.au		**Phone:**
Date Required:	Standard ☐		**Email:**
Prior Storage:	☐ Fridge	Do samples contain 'potential' HBM? Yes ☐ No ☐ (If YES, then handle, transport and store in accordance with FPM HAZID)	

	Sample ID	Lab ID	Sampling Date	Sample Type (S - soil W - water)	Container Type (G - glass P - plastic)	Analytes: Lead	PAH	Combo 8a	Combo 3	AF and FA	Asbestos ID	BTEX			Notes/preservation
✓	TP7/ 0.3-0.4	15	08/08/18	S	G	X	X								
✓	TP7/ 0.7-0.8	16	08/08/18	S	G	X	X								
✓	TP8/ 0.5-0.6	17	08/08/18	S	G			X							
✓	TP8/ 1.3-1.4	18	08/08/18	S	G				X						
✓	TP9/ 0-0.1	19	08/08/18	S	G			X							
✓	TP9/0.4-0.5	20	08/08/18	S	P					X					
✓	TP9/0.4-0.5 (A)	21	08/08/18		P						X				
✓	TP10/ 0.4-0.5	22	08/08/18	S	G	X	X								
✓	TP10/0.9-1.0	23	08/08/18	S	G	X	X								
✓	TP10/0-0.1	24	08/08/18	S	P					X					
✓	TP10/0-0.1 (A)	25	08/08/18		P						X				
✓	TP11/0-0.1	26	08/08/18	S	G	X	X								
✓	TP11/ 0.4-0.5	27	08/08/18	S	G	X	X								
	Trip Spike	28										X			
	Trip Blank	29										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: 198208

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

Send Results to: Douglas Partners Pty Ltd **Address:** **Phone:** **Fax:**

Signed: NW **Received by:** MT **Date & Time:** 10/8/18 15:30