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Report on
Detailed Site (Contamination) Investigation

Proposed Residential Development
Kamira Court, Villawood

Prepared for
New South Wales Land and Housing Corporation

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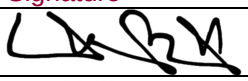
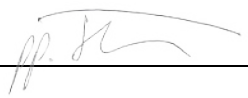
Author		3 March 2020
Reviewer		3 March 2020

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Table of Contents

Page

Report on Detailed Site (Contamination) Investigation
Proposed Residential Development
Kamira Court, Villawood

1. Introduction

This report presents the results of a Detailed Site (Contamination) Investigation (DSI) undertaken for a proposed residential development at Kamira Avenue and Villawood Road, Villawood (the site, as shown in Drawing 1, Appendix A). The investigation was commissioned in an email dated 18 November 2019 by Theresa Knowles of the New South Wales Land and Housing Corporation and was undertaken in accordance with Douglas Partners' (DP) proposal SYD191077 dated 14 October 2019.

It is understood that the proposed development involves the construction of three multi-storey residential buildings with public open spaces in between the buildings. Basement level car-parking is anticipated in the future planned development at the site.

A Preliminary Site Investigation (PSI) (DP 2019) was previously completed at the site which included a limited intrusive investigation and a review of previous investigations. The PSI concluded that there was a low likelihood of significant contamination risks to human health or the environment at the site. However, the PSI did not include a groundwater investigation, and parts of the current site, including soils beneath Kamira Court, were not included in the investigation.

The objective of this DSI is to characterise the nature and extent of soil and groundwater contamination at the site including data gaps identified in the PSI, assess the suitability of the site for the current and proposed land use and, if deemed necessary, make recommendations for further targeted investigations and / or remediation to render the site suitable for the proposed land use.

2. Scope of Work

The full scope of work comprised the following:

- Review of the previous site investigation reports prepared by Douglas Partners Pty Ltd (DP) which included intrusive soil sampling;
- Excavation of two test pits using an excavator within part of Lot 31 D.P. 36718 (not previously sampled);
- Drilling of six boreholes using a truck mounted drilling rig, three of which were within Kamira Court and three around the perimeter of the site, which were subsequently converted into groundwater monitoring wells;
- Collection of soil samples from the above test locations at regular intervals or upon signs of contamination, extending approximately 0.5 m into natural soils to complement the previous soil investigations conducted at the site;

- Excavation of an additional two test pits using an excavator down to natural soils or limit of excavator reach generating temporary stockpiles of excavated material for the purposes of limited excavated natural material (ENM) testing;
- Separation of bulk material, including larger anthropogenic materials from the generated stockpiles using a sieve bucket attached to an excavator;
- Collection of composite and discrete samples from resulting sieved stockpiles;
- Photographing and recording fill composition at all test locations;
- Screening of all soil samples collected with a photo-ionisation detector (PID) to assess the likely presence or absence of volatile organic compounds (VOC);
- Collection of three groundwater samples from the installed monitoring wells;
- Dispatch of selected soil and groundwater samples (plus 10% QA / QC samples) for analysis by a NATA accredited laboratory for a range of common contaminants and parameters including, metals, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylene (BTEX), phenols, organochlorine pesticides (OCP), organophosphorus pesticides (OPP), polychlorinated biphenyls (PCB), electrical conductivity (EC), pH and asbestos;
- Field sampling and laboratory analysis in compliance with standard environmental protocols, including a Quality Assurance / Quality Control (QA / QC) plan consisting of 10 % replicate sampling, trip spikes, trip blanks, appropriate Chain of Custody procedures and in-house laboratory QA / QC testing; and
- Preparation of this report.

It is noted that the limited ENM assessment and sieving of fill was undertaken to assess the potential for the existing fill to be amenable to those forms of management.

3. Site Identification

The site comprises Lots 37 and 39 in Deposited Plan 202006, Lot 136 in Deposited Plan 16186, and Lots 381 and 382 in Deposited Plan 1232437 and has frontages to both Kamira Avenue and Villawood Road, Villawood. The site is an irregular shape and covers an area of approximately 2.1 ha. Fairfield City Council is the local government authority.

The local topography is relatively flat with the ground surface gently sloping upwards from the south-west to the north-east. The ground surface levels ranging from about RL 22 m and RL 26 m relative to Australian Height Datum (AHD).

The site location is shown on Drawing 1, Appendix A.

4. Previous Reports

4.1 Preliminary Geotechnical and Contamination Assessment (DP 2008)

DP (2019) included a detailed review of the previous Phase 1 contamination assessment (DP 2008). In summary, DP (2008) included a site walkover, a review of available desktop information and a limited intrusive sampling investigation comprises eight test pits (TP1 to TP8, Drawing 1, Appendix A). Only minor exceedances of the provisional phytotoxicity base investigation levels were detected. The report recommended further assessment during any earthworks specifically for potential asbestos contamination, in addition to the development of a Remediation Action Plan (RAP) and an Asbestos Management Plan (AMP).

4.2 In-situ Waste Classification (DP 2010)

DP (2019) included a detailed review of the previous *in-situ* waste classification (DP, 2010), which comprised 17 additional test pits (TP1 to TP17, Drawing 1, Appendix A). The assessment indicated that the filling on site consisted of reworked natural clay with inclusions of rootlets and shale fragments with trace inclusions of anthropogenic materials including gravels, metal, concrete, brick, glass, timber, paint, tile and plastics. No Asbestos Containing Materials (ACM) were detected.

4.3 Preliminary Site (Contamination) Investigation (DP 2019)

DP (2019) comprised a review of previous investigations in addition to an updated review of readily available site history information and a limited intrusive investigation comprising seven additional test pits (TP101 to TP107, Drawing 1, Appendix A). The available site history information indicated that the site was previously vacant land before significant residential development by 1961 as a part of housing commission accommodation, with these structures later being demolished by 2009. A previous historic dry-cleaning business was identified operating between 1965-1982 approximately 43 m south-east of the site.

Fill was encountered to depths of up to 4-5 m below ground level (bgl), consisting of silty clay soils with trace amounts of anthropogenic materials including metal, brick plastic, bone, concrete, wire, tile and terracotta.

The concentrations of the selected analytes in all samples analysed were found to be within the site assessment criteria and / or below the laboratory practical quantification limit. No potential ACM was identified during fieldwork or by laboratory analysis. The investigation considered a low likelihood of significant contamination risk and recommended the development of an unexpected finds protocol for any excavation / development works. Further investigations were recommended within areas of the site not assessed including soils beneath the Kamira Court road surface in addition to a groundwater investigation to guide any de-watering management during the proposed development.

Other data gaps identified subsequent to preparation of the DP (2019) report comprised:

- The south western part of Lot 31 in DP36718 was added to the site area, and was therefore, not previously sampled; and
- Given the previous dry-cleaning operations to the east of the site, it was considered prudent to assess groundwater conditions at the eastern boundary of the site.

5. Conceptual Site Model

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

5.1 Potential Contamination Sources and Contaminants of Concern

Based on the previous investigations, the following potential sources of contamination and associated contaminants of concern have been identified.

Table 1: Potential Contamination Sources and Contaminants of Potential Concern (COPC)

Potential Source	Description of Potential Contaminating Activity	Contaminants of Potential Concern
S1 - Demolition and deterioration of previous site structures	Impact on soils due to demolition and removal of former structures and / or deterioration of structures prior to demolition.	Asbestos, metals, PCB, and / or other hazardous building materials.
S2 - Imported fill	Use of uncontrolled fill (and / or topsoil) for landscaped areas or site levelling.	Asbestos, heavy metals, TRH, VOC, BTEX, PAH, OCP, OPP, PCB and phenols.
S3 - Moderate to high risk activities surrounding the site	Historical records indicate the presence of licensed activities (including a dry cleaner) nearby the site.	Metals, TRH, BTEX, PAH, Phenols, VOC.

Notes :

TRH	total recoverable hydrocarbons
BTEX	benzene, toluene, ethylbenzene, xylene
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
OCP	organochlorine pesticides
OPP	organophosphorus pesticides
VOC	volatile organic compounds

It is noted, however, that previous investigations have not identified the presence of the COPC at concentrations above the adopted site assessment criteria.

5.2 Potential Receptors

5.2.1 Human Health Receptors

R1 End users (commercial and residential, including visitors);

R2 Construction and maintenance workers; and

R3 Adjacent site users (residential and commercial).

5.2.2 Environmental Receptors

R4 Groundwater; and

R5 Terrestrial ecology.

5.2.3 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; and

P4 Contact with terrestrial ecology.

5.3 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 and S3) and receptors (R1 to R4) are provided in Table 2 below.

Table 2:Summary of Potential Complete Pathways

Potential Source and Contaminants of Concern	Pathway	Receptor	Action Recommended
S1 - Demolition / deterioration of previous or current site structures	P1 - Ingestion and dermal contact	R1 - End users R2 - Construction and maintenance workers	Assessment of near surface soils for remnant contaminants. This was largely completed through the previous investigations. Additional sampling and testing of such soils in areas previously not sampled.
	P2 - Inhalation of dust and/or vapours	R1 - End users R2 - Construction and maintenance workers R3 - Adjacent site users	
S2 - Imported fill	P1 - Ingestion and dermal contact	R1 - End users R2 - Construction and maintenance workers	An intrusive investigation is recommended to assess possible contamination including chemical testing of the soils. This was largely completed through the previous investigations. Additional sampling and testing of such soils in areas previously not sampled. An assessment of groundwater quality to assess actual impacts to groundwater.
	P2 - Inhalation of dust and / or vapours	R1 - End users R2 - Construction and maintenance workers R3 - Adjacent site users	
	P3 - Leaching and vertical migration into groundwater	R4 - Groundwater	
	P4 - Contact with terrestrial ecology	R5 - Terrestrial ecology	
S3 - Moderate to high risk activities surrounding the site	P1 - Ingestion and dermal contact P2 - Inhalation of vapours P3 - Leaching and vertical migration into groundwater	R1 - End users R2 - Construction and maintenance workers R3 - Adjacent site users R4 - Groundwater	An assessment of groundwater quality to assess actual impacts. Source determination may be needed as a second stage of investigation.

6. Fieldwork, Analysis and QA / QC

6.1 Sample Location and Rationale

The site covers an area of approximately 2.1 ha. According to the NSW EPA publication, *Sampling Design Guidelines* (1995), a minimum of thirty-one (31) systematic sampling points are recommended to characterise a site of this size. This recommendation was satisfied through the previous investigations, with a total of 32 sampling locations. The additional intrusive sampling completed as part of the DSI were specifically targeted to identified data gaps, as follows:

- Two test pits (TP9 and TP10) were positioned in the south western part of Lot 31, D.P.36718, not previous sampled;
- Three boreholes (BH1 to BH3) were positioned within the footprint of Kamira Court, which was not previously sampled;
- Three additional bores (MW1 to MW3) were positioned around the perimeter of the site to be converted into groundwater monitoring bores in order to assess groundwater quality across the site, focusing on the south eastern side to assess any potential contamination from the historic dry-cleaning business to the south east, with a well to the west to allow triangulation for determining the groundwater flow direction; and
- Two test pits (TPA and TPB) were excavated in filled area to permit a preliminary assessment of fill against ENM criteria.

Test locations were excavated 0.5 m into natural soils, prior refusal or to the limit of excavation (nominal depth of 4 m) in the case of the test pits. Boreholes MW1 to MW3 were extended further until encountering groundwater, or to a nominal depth of approximately 10 m bgl. Soil samples were collected from all test locations (with the exception of TPA and TPB), at regular intervals or upon signs of contamination. Selected soil samples were analysed for the chemicals of concern listed in Section 5 and DP (2019). Samples were selected based on site observations (odour, composition etc.), and their location within the subsoil strata (*i.e.,* fill or natural).

Test pits TPA and TPB were excavated to generate stockpiles of fill material for the purposes of a limited ENM assessment. TPA and TPB were positioned to investigate areas where deeper fill was previously encountered. Stockpiled soils were bulk screened on-site using a sieve bucket attached to an excavator prior to the collection of discrete, composite and bulk samples from the screened stockpiles.

Prior to commencing sampling, all test locations were cleared for underground services by a services locator.

Current and previous test locations are shown on Drawing 1, Appendix A.

6.2 Soil Sampling Procedure

6.2.1 General Sampling Procedure

Environmental sampling was performed with reference to current industry standards. All sampling data was recorded on DP chain of custody sheets. The general sampling and sample management procedures comprised:

- Collection of samples into laboratory-prepared glass jars with Teflon lined lids, capping immediately to minimise headspace within the sample jar;
- Collection of replicate samples in zip-lock bags for PID screening;
- New disposable nitrile gloves were worn by the field scientist / engineer for each sample collected thereby precluding potential cross-contamination;
- Collection of 10% replicate samples for QC purposes;
- Labelling of sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable); and
- Placement of the sample jars into a cooled, insulated and sealed container for transport to the laboratory.

6.3 Groundwater Sampling Procedure

Prior to development and sampling, the water level and presence of phase separated hydrocarbons was measured in the monitoring well using an interface meter.

Field parameters [pH, temperature, dissolved oxygen (DO), conductivity, turbidity and redox] were measured with a calibrated water quality meter, where there was sufficient well volume. Field data was recorded on field sheets. Once equilibrium was achieved groundwater was sampled using a low flow pump (where possible) from a depth close to the top of the observed water column.

Groundwater samples were collected in laboratory prepared bottles and vials. Samples collected for metals analysis were filtered in the field using a 0.45 µm filter.

A groundwater replicate sample was collected by decanting equal portions of groundwater into separately and uniquely labelled groundwater bottles. Sample bottles were filled directly from the pump outlet to minimise disturbance.

Each water sample container had an individual and unique identification, including project number, sample location and sample depth. The containers were then be placed into an ice cooled, insulated and sealed container for transport to the laboratory (with chain-of-custody).

Where reusable sampling equipment was used, sampling equipment was decontaminated between use. The decontamination procedure involved a three-stage wash. The equipment was first rinsed with tap water to remove sediment followed by a 3% Decon 90 solution. Finally, the equipment was rinsed in demineralised water.

The analysis of QA / QC samples included one trip spike and trip blank (analysed for BTEX).

Samples were sent to Envirolab Services Pty Ltd, a NATA accredited laboratory, for analysis.

6.4 Analytical Rationale

The analytical scheme for soil samples was designed to obtain an indication of the potential presence and possible distribution of identified contaminants of potential concern identified by the CSM, being metals, TRH, BTEX, PAH, OCP, OPP, PCB, VOC, phenols and asbestos. The results of the analytical testing were compared with the adopted site assessment criteria (SAC) discussed in Section 7.

6.5 Quality Assurance and Quality Control (QA / QC)

This DSI has been devised in general accordance with the seven-step data quality objective (DQO) process which is provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the problem;
- Identify the decision;
- Identify inputs into the decision;
- Define the boundary of the assessment;
- Develop a decision rule;
- Specify acceptable limits on decision errors; and
- Optimise the design for obtaining data.

The DQOs adopted for this investigation are provided in Appendix C.

6.6 Data Quality Indicators

The performance of the assessment in achieving the DQO was assessed through the application of data quality indicators (DQI) as defined by:

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

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

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

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

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

Further comments on the DQIs are presented in Appendix C.

7. Site Assessment Criteria

The Site Assessment Criteria (SAC) are the criteria which were used to the suitability of the site for the proposed land use. The Site Assessment Criteria (SAC) applied in the current investigation are informed by the CSM, which identified human and environmental receptors to potential contamination on the site, as well as consideration of the proposed development.

The laboratory soil analytical results have been assessed against the investigation and screening levels in Schedule B1 the National Environment Protection Council (NEPC) guidelines (NEPC 2013). The NEPC guidelines are endorsed by the EPA under the CLM Act 1997. Schedule B1 (NEPC 2013) provides investigation and screening levels for commonly encountered contaminants which are applicable to generic land uses, and where relevant, also include consideration of soil type and the depth of contamination. It should be highlighted that the investigation and screening levels are not intended to be used as clean up levels, and any contaminants which have concentrations that exceed the investigation/ screening levels should be further assessed using a Tier 2 risk assessment. Health Screening levels for direct contact with contaminants are adopted from the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) Technical Report no.10 (Friebel and Nadebaum 2011), in accordance with NEPC (2013).

Groundwater laboratory analytical results have been assessed against the groundwater investigation levels (GIL) adopted in NEPC (2013) which are based on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018). The 95% Level of Protection (LOP) has been adopted with the exception of contaminants with the potential to bioaccumulate, which have been assessed with reference to the 99% LOP in accordance with the guidance.

Appendix D, outlines the relevant investigation and screening levels adopted for soil and groundwater, as documented in NEPC (2013). All site specific and/or theoretical assumptions relevant to the selection of the investigation and screening levels have been outlined in each sub-section in Appendix D as required.

8. Field Work Results

8.1 Observations

At the time of sampling, the site was observed to consist of two portions of vacant land bisected by Kamira Court. The northern portion of the site was fenced-off and bound by Villawood Road, Kamira Avenue and Kamira Court, and the southern portion was bound by Kamira Avenue, Kamira Court, an open public park / path to the south and vacant land at the rear of the commercial buildings to the east. The ground surface in both portions comprised open grassed areas with minimal tree cover and minor amounts of anthropogenic material, possibly fly tipped, visible on the surface.

Fragments of potential asbestos containing material (ACM-1 to ACM-4) were observed at the ground surface in the north-west portion of the site, close to the boundary fence. The source of the fragments is not known, however, given the proximity to the boundary fence, it is possible that the fragments were introduced from outside the site. Laboratory analysis on one of the samples (ACM-2) confirmed the presence of asbestos. Based upon the similarity of the fragments the remaining samples are presumed to contain asbestos.

8.2 Soil

The subsurface conditions encountered in the test pits and boreholes excavated in this current investigation are presented in the test pit logs in Appendix E, accompanied by notes for the related descriptive terms and classification methods. The test locations of both the current and previous investigations are shown on Drawing 1, Appendix A. The materials encountered in the test pits and boreholes (current investigation) can be described as follows:

- FILL: Gravelly sand with igneous gravels (directly beneath Kamira Court road surface) and silty / gravelly clay & clay with gravels and anthropogenic inclusions, including concrete, brick, tile and wood. A fragment of potential ACM (material sample A1) collected in the fill from MW1 was analysed in the laboratory and confirmed to contain asbestos;
- RESIDUAL SOILS: Typically, low to medium or medium to high plasticity, red-brown mottled grey, brown with silt and trace gravels; and
- SHALE: Grey and grey-brown, apparently low to medium strength Bringelly Shale.

With the exception of bonded asbestos, no other obvious signs of contamination were observed.

PID results were all <1 ppm which indicates a low potential for contamination from volatile chemicals.

8.3 Groundwater

Groundwater wells were constructed in boreholes MW01 - MW03, and details of the well construction are provided in the borehole logs in Appendix D. Field sheets detailing the development and sampling of the wells are provided in Appendix E.

Groundwater was measured between 7.0 to 8.55 m bgl at the time of sampling. Based on the regional topography and the triangulation of measured water levels at this time, a groundwater flow direction towards the north east is interpreted. It should be noted that groundwater levels change over time.

No Phase separated hydrocarbons were observed or recorded using an interface meter during both well development and sampling. Groundwater parameters were only available from one test location (MW1) due to insufficient well volumes at MW2 and MW3, where the collection of samples was prioritised over measuring parameters. Stabilised groundwater parameters indicate slightly elevated electrical conductivity (EC) at 6.1 mS/cm compared to a desirable freshwater EC of approximately 0.8 mS/cm indicating brackish water, in addition to a measured pH of 5.51 indicating slightly acidic conditions.

Groundwater was observed to be pale grey-brown to dark grey-brown, likely due to cuttings from the natural shale being present in the annulus of the well at the time of sampling.

At the time of the site works no surface water was observed at the locations previously identified in DP (2019).

9. Laboratory Testing

The results of the laboratory analysis for the current investigation are summarised in Appendix G. Laboratory certificates of analysis, chain-of-custody documentation and sample receipt advice are provided in Appendix H.

9.1 Soil

Table G1, Appendix G summarises the soil laboratory results relative to the SAC. All samples analysed returned results less than he laboratory practical quantification limit (PQL) and / or adopted health-based SAC. Exceedances of the adopted ecological limits were detected in samples BH1/0.8-1.0 and BH2/0.3-0.5 for copper and TRH (C16-C34).

Asbestos was not detected in any of the analysed soil samples, however, asbestos was detected in two material samples, one of which (A1) was recovered from borehole MW2 and the other from the ground surface at the north west corner of the site (ACM-2). The locations of the tested material samples are shown in Drawing 2, Appendix A.

9.2 Preliminary Waste Classification

A six-step procedure for determining the type of waste and the waste classification is provided in the NSW EPA *Waste Classification Guidelines* (EPA 2014a). Part of the procedure, for materials not classified as special waste or pre-classified waste, is a comparison of analytical data initially against contaminant threshold (CT) values specific to a waste category. Alternatively, the data can be assessed against specific contaminant concentration (SCC) thresholds when used in conjunction with toxicity characteristic leaching procedure (TCLP) thresholds.

The CT, SCC, and TCLP values relevant to this waste classification are shown in Table G2 (Appendix G).

The following Table 3 presents the results of the six-step procedure outlined in EPA (2014a) for determining the type of waste and the waste classification. This process applies to the fill at the site.

Table 3: Six Step Classification

Step	Comments	Rationale
1. Is it special waste?	Yes (refer to Drawing 2, Appendix A)	Asbestos containing materials were detected at one test location, with additional fragments of bonded asbestos observed on the ground surface as shown in Drawing 2, Appendix A. At all other test locations, no asbestos-containing materials (ACM), or coal tar, clinical or related waste, or waste tyres were observed in the boreholes. Asbestos was not detected by the analytical laboratory.
2. Is it liquid waste?	No	Materials composed of a soil matrix.
3. Is the waste "pre-classified"?	No	Fill did not fall into one of the pre-classified categories.
4. Does the Waste have hazardous waste characteristics	No	Waste not observed to / or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances, substances liable to spontaneous combustion.
5. Chemical Assessment	Conducted	Refer to Table G2 in Appendix G
6. Is the Waste Putrescible?	No	All observed components of filling composed of materials pre-classified as non-putrescible [a] (i.e., soil).

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

As shown in Table G2 (Appendix G) all contaminant concentrations for the analysed fill samples were within the contaminant thresholds (CT1s) for General Solid Waste (GSW with the exception of nickel (59 mg/kg BH1/0.05-0.15) and chromium (110 mg/kg BD1/20191126, replicate sample of TP9/0-0.3 m) exceeding CT1 but within CT2. TCLP testing conducted on BD1/20191126 resulted in concentrations below SCC1 and TCLP1.

Asbestos containing materials were detected at one test location, with additional fragments of bonded asbestos identified on the ground surface as shown in Drawing 2, Appendix A.

Based on the field observations and analytical data, the fill material, as described in the attached logs (Appendix G) and Section 8, is preliminary classified *in situ* as:

- For the yellow hatched areas shown in Drawing 2, Appendix A as **General Solid Waste (non-putrescible) - Special Waste (asbestos)**;
- For the green hatched areas shown in Drawing 2, Appendix A as **Restricted Waste (non-putrescible)**; and
- For areas not within the hatched areas shown in Drawing 2, Appendix A as **General Solid Waste (non-putrescible).**

Given the concentration of BH1/0.05-1.15 is within SCC1 TCLP, additional TCLP analysis may reduce the classification within the green hatched area. Additionally, based upon the presence of building rubble and the limited detection of ACM it is possible that additional undetected ACM may be present in fill across the site. As such it is recommended that excavation of fill is conducted in a way to minimise the generation of large stockpiles of material which may potentially cross contaminate fill with ACM.

9.2.1 Conditions

Division 4, Section 45, of *The Protection of the Environment Operations (Waste) Regulation 2014* states that it is an offence for waste to be transported to a place that cannot lawfully be used as a facility to accept that waste. It is the duty of the owner and transporter of the waste to ensure that the waste is disposed of appropriately. DP does not accept liability for the unlawful disposal of waste materials from any site. DP accepts no responsibility for the material tracking, loading, management, transport or disposal of waste from the site. Before disposal of the material to a licensed landfill is undertaken, the waste producer will be required to obtain prior consent from the landfill.

Both the receiving site and the site disposing of the material should satisfy the requirements of the licence before disposal of the material is undertaken. Note that appropriate prior arrangement with the receiving site / relevant authorities should be obtained prior to the disposal of any material off site. The receiving site should check to ensure that the material received matches the description provided in this report and contains no cross contamination.

9.3 Limited ENM Assessment

A limited ENM assessment was conducted at two test locations (TPA and TPB) where small stockpiles of fill material were generated by excavating fill material down to natural soils. The stockpile fill material was subsequently bulk screened on-site using a sieve bucket attached to an excavator. Composite and discrete samples were then recovered from the screened material and analysed as per the requirements of the ENM Order (EPA 2014b).

The objective of this limited assessment was to validate a trial ENM test on excavated materials whereby low quantities of generally larger sized anthropogenic material could be separated using a sieve bucket attachment on an excavator. It is understood that this trial ENM test will be used to inform future earthworks and waste management for a proposed future residential development at the site.

9.3.1 Assessment Criteria

The ENM Order provides a definition of excavated natural material as naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

a) Been excavated from the ground;

b) Contains at least 98% (by weight) natural material; and

c) Does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.

The ENM Order states that the *generator must not supply excavated natural material waste to any person if, in relation to any of the chemical and other attributes of the excavated natural material:*

- *The chemical concentration or other attribute of any sample collected and tested as part of the characterisation of the excavated natural material exceeds the absolute maximum concentration or other value listed in Column 3 of Table 4; and*
- *The average concentration or other value of that attribute from the characterisation of the excavated natural material (based on the arithmetic mean) exceeds the maximum average concentration or other value listed in Column 2 of Table 4; and*
- *The absolute maximum concentration or other value of that attribute in any excavated natural material supplied under this order must not exceed the absolute maximum concentration or other value listed in Column 3 of Table 4.*

9.3.2 Assessment Procedure

The following Table 4 presents the results of the assessment for ENM with reference to the ENM Order (EPA 2014b).

Table 4: ENM Classification Procedure

Item	Comments	Rationale
1. Are the materials acid sulfate soils?	No	NSW Acid Sulfate Soil Risk Mapping (1994-1998) data, supplied by NSW Department of Environment and Climate Change, indicates that the site is within an area low probability of occurrences of acid sulfate soils.
2. Does the material contain asbestos?	No *	No asbestos-containing materials (ACM) were observed in the subject materials. No asbestos was detected in the analysed samples.
3. Has the sampling been undertaken in accordance with Tables 1 and 4 of the ENM Order?	Yes	Sample numbers in stockpiled materials are in accordance with the ENM Order.
4. Has the analysis been carried out in accordance with the ENM Order?	Yes	All samples were analysed in a NATA accredited laboratory for the chemical and other attributes listed in Table 4 of the ENM Order.
5. Do the maximum and average chemical concentrations comply with Table 4 of the ENM Order?	Yes	Refer to attached Table G3.

NOTE: * As discussed in Section 9.1, ACM has been found at one location in the fill.

The laboratory test results are summarised in the attached Table G3. All analytical results were within the criteria required by the ENM Order (EPA 2014b).

Based on the results presented within this limited assessment it is possible that materials within and nearby TPA and TPB may be classified as ENM, if appropriate *ex-situ* testing is conducted on materials which have been separated of larger anthropogenic materials following excavation. However, it is noted that anthropogenic materials were observed to be passing through the sieved fraction of materials from both TPA and TPB, and given the possible variability of fill, no certainty can be given that all excavated material in the vicinity of the test locations, or other parts of the site, will meet the definition of ENM as prescribed in EPA (2014b).

Any additional fill material across the site would require further testing in accordance with the ENM Order (EPA 2014b) to be classified as ENM. Furthermore, it is noted that asbestos was detected at select locations (as shown in Drawing 2, Appendix A) and varying amounts of anthropogenic materials have been detected in fill which may exceed the ENM Order (EPA 2014b) requirements. To assist in potentially classifying any additional material as ENM it is recommended to excavate fill in such a way to generate smaller sized stockpiles, subject to further analysis.

It is also noted that the ENM Order does not allow for processing of material. Sieving may be seen as a method of processing and should be avoided if compliance with the ENM Order is sought. A method of manually removing large anthropogenics may be an appropriate method of managing the soils as an alternative. Again, this should be completed and assessed in small batches as recommended above.

9.4 Groundwater

Table G4, Appendix G summarises the groundwater laboratory results relative to the SAC. All measured contaminants of concern were below the PQL and / or the SAC with the exception of nickel and zinc.

Nickel and zinc concentrations were similar across the three monitoring wells, suggesting that the source is not likely to be within the site. The concentrations are likely to be representative of regional conditions.

Samples MW1 and MW2 reported elevated hardness values > 3000 mg $CaCO_3$/L. It is considered these elevated values are attributed to the presence of natural minerals present in the shale cuttings visible in the extracted groundwater. Laboratory pH values ranged from 7.2-8.2 compared to the field stabilised value of 5.5.

Elevated concentrations of TPH (>C10-C34) in MW2 and MW3 were detected in two of the wells located approximately upgradient of the inferred local groundwater flow direction and at the periphery of the site. It is noted that the TPH fractions observed do not have health screening levels prescribed in NEPC (2013).

Examination of the provided chromatograms by the laboratory for the analysed samples (MW2 and MW3) did not identify a specific set of compounds but rather a broad range of long chain length hydrocarbons contributing to the total TRH measured. Further analysis using silica gel clean-up to remove any organic compounds contributing to the total measured TRH resulted in only slightly lowered TPH values for both samples.

Furthermore, based upon the measurements at the time of sampling groundwater depth was observed from 7.0 to 8.55 m bgl across the site, it is understood that the proposed development at this stage is likely to only comprise a single level basement such that the measured groundwater is approximately 3 - 3.55 m below the proposed final level for a conservative basement depth of 4 m. Despite this, it is noted that groundwater levels are transient and can change with weather conditions and time. In particular, groundwater was sampled at the site during a relatively dry period such that during a wetter period the groundwater levels may change.

Overall, the elevated TPH levels are not considered to present an immediate risk to human health for the proposed land-use and would primarily be a consideration should any dewatering and associated waste disposal, be necessary during the proposed development. However, it is recommended that additional groundwater testing be conducted to verify the results and ascertain whether actual significant contamination is migrating on-site.

10. Conclusion

Based upon a review of previous investigations and the results of the current investigation targeting previous data gaps, the soils beneath the site largely consist of potentially reworked natural clays (fill) with low to trace amounts of anthropogenic materials including building rubble.

With the exception of soils from beneath Kamira Court and limited asbestos finds (as shown in Drawing 2, Appendix A), the concentrations of the selected analytes in all soils were found to be within the SAC. The soils beneath Kamira Court reported exceedances of ecological based SAC, which may be managed by removing from site as part of bulk excavation works (for basements) or relocating in areas not exposed to proposed landscaping.

With the exception of the asbestos detected at MW1 in shallow soils, the remainder of the asbestos finds were observed on the ground surface, localised in the north west corner of the site (as shown in Drawing 2, Appendix A). It is considered possible that the materials may have been fly tipped on the site. However, based upon the presence of anthropogenic materials, including building rubble commonly associated with ACM it is possible that additional ACM is present in soils between test locations and other un-observed parts of the site. Soils impacted with ACM are to be waste classified for off-site disposal. In the areas where surficial asbestos was identified, the contamination risk may potentially be managed via a process of ‘emu picking’ visible ACM, followed by a surface clearance by a suitability qualified consultant or hygienist.

Furthermore, it is recommended that an unexpected finds protocol is prepared and implement during any site works to address any soils potentially impacted by contamination (such as asbestos). Any soils potentially impacted by contamination which are identified during site works are to be segregated and assessed by a suitability qualified consultant to confirm their suitability to remain on site, or appropriate waste classification for off-site disposal. The process would be outlined in the unexpected finds protocol.

Groundwater results indicate that there is no obvious contamination from the previous historic dry cleaner which operated 43 m south-east of the site. Additionally, no exceedances of the adopted SAC were detected indicating that groundwater contamination is not present. Detection of elevated TPH levels are not considered to pose an immediate health risk for the proposed development but are

considered to be a potential issue for any future dewatering and waste disposal. Therefore, additional groundwater monitoring is recommended to verify the test results and fully characterise the potential for contamination to be migrating on-site.

On basis of the results of previous investigations and the results presented in this report, it is considered that there is a low to medium likelihood of significant contamination risks to human health or the environment associated with the site. It is considered that the site can be made suitable from a contamination perspective, for the proposed residential development subject to the recommendations listed above.

11. References

DP (2008) - *Report on Preliminary Geotechnical and Contamination Assessment, Kamira Court - Urban Renewal Projects, Villawood, NSW,* DP Report 45789 dated 2008.

DP (2010) - *Report on In-Situ Waste Classification Assessment, Kamira Court, Villawood,* DP Report 45789.01 dated May 2012.

DP (2019) - *Report on Preliminary Site (Contamination) Investigation, Proposed Residential Development, Kamira Avenue and Villawood Road, Villawood*. DP Report 86819.00.R.001.Rev1 dated 22 August 2019.

EPA (2014a) - NSW EPA *Waste Classification Guidelines. Part 1: Classifying Waste.*

EPA (2014b) - NSW EPA *The Recovered ENM Order 2014.*

Friebel, E and Nadebaum, P (2011), *Health screening levels for petroleum hydrocarbons in soil and groundwater. Part 1: Technical development document,* CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia

POEO Act - *Protection of the Environment Operations Act 1997.*

NSW EPA - Web Site.

NEPC (2013) - National Environment Protection (Assessment of Site Contamination) Measure 1999 amended 2013.

NSW EPA (1995) - Sampling Design Guidelines.

12. Limitations

Douglas Partners (DP) has prepared this report (or services) for this project at Kamira Court, Villawood in accordance with DP's proposal SYD 191077 dated 22 October. The work was carried out under DP's conditions of Engagement. This report is provided for the exclusive use of the New South Wales Land and Housing Corporation 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.

Asbestos has been detected by observation or by laboratory analysis, either on the surface of the site, or in fill materials at the test locations sampled and analysed. Building demolition materials, such as concrete, brick and tile, were also located in previous below-ground filling and these are considered as indicative of the possible presence of additional hazardous building materials (HBM), including asbestos in fill across the site.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions and / or to budget constraints. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent

upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the environmental components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

Appendix A

About This Report

Drawings

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

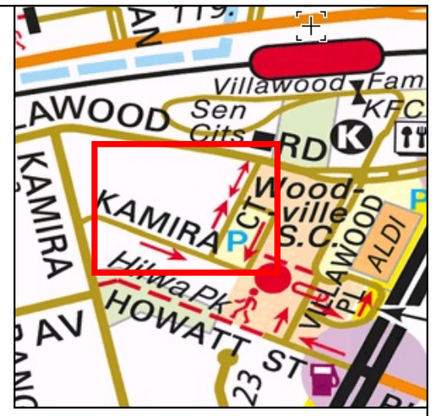
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later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

Information for Contractual Purposes

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

Site Inspection

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



Locality Map

Legend

- Site Boundary
- Part Kamira Court
- Part Lot 31, DP 36718
- Test Pits (Previous Investigation, 2008)
- Test Pits (Previous Investigation, 2010)
- Test Pits (Previous Investigation, 2019)
- Groundwater Wells
- Borehole Locations
- Testpit Locations
- ENM Investigation Testpits

0 25 50 75 m

NOTE:
1: Base drawing from Nearmap.com (Dated 25/07/2019)

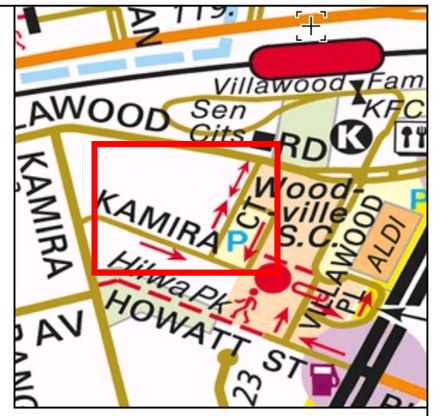
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	NSW Land and Housing Corporation (LAHC)		
OFFICE:	Sydney	DRAWN BY:	JJH
SCALE:	1:850	DATE:	31.01.2020

TITLE: **Sampling Locations (Current and Previous)**
Detailed Site (Contamination) Investigation
Kamira Court, Villawood

N

PROJECT No:	86819.01
DRAWING No:	1
REVISION:	0



Locality Map

Legend

- Site Boundary
- Part Kamira Court
- Part Lot 31, DP 36718
- Abestos Finds
- CT1 Exceedances
- Abestos Material Samples
- Test Pits (Previous Investigation, 2008)
- Test Pits (Previous Investigation, 2010)
- Test Pits (Previous Investigation, 2019)
- Groundwater Wells
- Borehole Locations
- Testpit Locations
- ENM Investigation Testpits

0 25 50 75 m

NOTE:
1: Base drawing from Nearmap.com (Dated 25/07/2019)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	NSW Land and Housing Corporation (LAHC)		
OFFICE:	Sydney	DRAWN BY:	JJH
SCALE:	1:850	DATE:	31.01.2020

TITLE: **Asbestos Finds and In-Situ Waste Classification Areas**
Detailed Site (Contamination) Investigation
Kamira Court, Villawood

N

PROJECT No:	86819.01
DRAWING No:	2
REVISION:	0

Appendix B

Site Photographs

Photo 1: Stockpile SPA source

Photo 2: SPA prior to sieving

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	1
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 3: SPA passing fraction

Photo 4: SPA retained fraction

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	2
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 5: SPA additional anthropogenics in passing fraction (plastic & concrete)

Photo 6: SPA larger anthropogenics in retained fraction

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	3
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 7: Stockpile SPB source

Photo 8: SPB prior to sieving

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	4
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 9: SPB passing fraction

Photo 10: SPB retained fraction

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	5
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 11: Southern portion of site, fly tipped waste

Photo 12: Northern portion of site

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	6
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Photo 13: Surficial ACM fragments ACM-2

Photo 14: Surficial ACM fragment ACM-3

Douglas Partners Geotechnics / Environment / Groundwater	**Site Photographs**	PROJECT:	86819.01
	Detailed Site Investigation	PLATE No:	7
	Kamira Avenue and Villawood Road, Villawood	REV:	0
	CLIENT: NSW Land and Housing Corporation	DATE	05/02/2020

Appendix C

Quality Assurance and Quality Control

DATA QUALITY ASSESSMENT

Q1. Data Quality Objectives

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

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

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

Table Q1: Data Quality Objectives

Data Quality Objective	Report Section Where Addressed
State the Problem	S1 Introduction
Identify the Decision	S10 Conclusion
Identify Inputs to the Decision	S1 Introduction S7 Site Assessment Criteria / Appendix D S8 Field Work Results S9 Laboratory Testing
Define the Boundary of the Assessment	S1.1 Site Identification and Description Site Drawings 1 - Appendix A
Develop a Decision Rule	S7 Site Assessment Criteria / Appendix D
Specify Acceptable Limits on Decision Errors	S6 Fieldwork QA / QC Procedures and Results - Appendix C
Optimise the Design for Obtaining Data	S2 Scope of Works S6 Fieldwork Methods and Rationale QA / QC Procedures and Results - Appendix D

Q2. FIELD AND LABORATORY QUALITY CONTROL

The field and laboratory quality control (QC) procedures and results are summarised in Tables Q2 and Q3. Reference should be made to the fieldwork and analysis procedures in Section 6 and the laboratory results certificates in Appendix H 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]
Trip Spikes	1 per field batch	60-140% recovery	yes
Trip Blanks	1 per field batch	<PQL/LOR	yes
Rinsates	1 per day	<PQL/LOR	yes[2]

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

Table Q3: Laboratory QC

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

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

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

Q2.1 Intra-Laboratory Replicates

Intra-laboratory replicates were analysed as an internal check of the reproducibility within the primary laboratory 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 and 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. Where reported values are both less than 5 times the LOR / PQL the RPD has been given as zero.

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

Lab	Sample ID	Date Sampled	Units	Metals								PAH				TRH				BTEX			
				Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Napthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Total PAH	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-34)	F4 (>C34-40)	Benzene	Toluene	Ethylbenzene	Total Xylenes
ELS	BD3/20191217	17/12/2019		6	<0.4	14	23	14	<0.1	8	45	<1	<0.05	<0.5	<0.05	<25	<50	<100	<100	<0.2	<0.5	<1	<1
ELS	MW1/0-0.2	17/12/2019		5	<0.4	11	27	11	<0.1	5	34	<1	<0.05	<0.5	<0.05	<25	<50	<100	<100	<0.2	<0.5	<1	<1
Difference			mg/kg	1.0	0.0	3.0	4.0	3.0	0.0	3.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD			%	-	-	24.0	16.0	24.0	-	**46.2**	27.8	-	-	-	-	-	-	-	-	-	-	-	-
ELS	BD1/20191126	26/11/2019		11.0	<0.4	110.0	42.0	39.0	0.2	7.0	68.0	<1	<0.05	<0.5	<0.05	<25	<50	<100	<100	<0.2	<0.5	<1	<1
ELS	TP9/0-0.3	26/11/2019		10.0	<0.4	59.0	24.0	32.0	<0.1	10.0	46.0	<1	<0.05	<0.5	<0.05	<25	<50	<100	<100	<0.2	<0.5	<1	<1
Difference			mg/kg	1.0	0.0	51.0	18.0	7.0	0.1	3.0	22.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RPD			%	-	-	**60.4**	**54.5**	19.7	-	**35.3**	**38.6**	-	-	-	-	-	-	-	-	-	-	-	-

Notes: not applicable, not tested

Table Q5: Relative Percentage Difference Results - Intra-laboratory Soil Replicates

Lab	Sample ID	Date Sampled	Metals								VOC		
			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Naphthalene	TCE	Chloroform
ELS	MW1	24/01/2020	<1	0.2	<1	1	<1	<0.05	16	23	<1	<1	<1
ELS	BD1/20200124	24/01/2020	<1	0.1	<1	<1	<1	<0.05	15	15	<1	<1	<1
Difference		mg/kg	0.0	0.1	0.0	0.0	0.0	0.0	1.0	8.0	0.0	0.0	0.0
RPD		%	-	-	-	-	-	-	6.5	**42.1**	-	-	-

Notes: not applicable, not tested

The calculated RPD values were within the acceptable range of ± 30 for inorganic analytes and ± 50% for organics with the with the exception of those 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 soil duplicates, were used to minimise the risk of possible 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 a
- All other QA / QC parameters met the DQIs.

The overall inter-laboratory replicate comparisons indicate that the sampling technique was generally consistent and repeatable.

Q.2.2 Trip Spike

The purpose of a trip spike is to assess the potential for loss of volatile analytes to have occurred between the time of collection and analysis of the sample by the laboratory.

For soils, laboratory preparation of the trip spike involved putting 1mL of BTEX (using a 1500 ppm BTEX trip spike standard) into two jars which were cross referenced and labelled ‘trip spike’ and ‘control’. Both jars were sealed. The trip spike was taken onto site and subject to the same jar storage and transfer as the field samples. The control was stored by the laboratory in the refrigerator. Following receipt of the trip spike, the laboratory analysed both the trip spike and corresponding control with results of the trip spike being expressed as the % difference from the control sample.

For water trip spikes, the laboratory prepared the trip spike by injecting 220 µL of BTEX into the trip spike. The results were then analysed and expressed as % of theoretical value of a 50ppb standard.

The generally acceptance limit for trip spikes is 60-140% in difference compared to the control or standard.

The results of the laboratory analysis for the trip spikes are shown in Tables Q6 (soil).

Table Q6: Trip Spike Results – Soils (% Recovery)

Sample ID	Benzene	Toluene	Ethylbenzene	m + p Xylene	o Xylene
Trip spike / 20201217	95	96	90	89	90

Results indicate that the percentage loss for BTEX during the trip was minimal and therefore appropriate preservation techniques were employed.

Q2.3 Trip Blank

The purpose of a trip blank is to assess the potential for transfer of contaminants into samples to have occurred between the time of collection and analysis of the sample by the laboratory. Laboratory prepared soil field blanks were taken out to the field unopened, subjected to the same preservation methods as the field samples, then analysed for the purposes of determining whether transfer of contaminants into the blank sample had occurred prior to reaching the laboratory. The results of the laboratory analysis for the field blanks are shown in Tables Q7 (soil).

Table Q7: Trip Blank Results - Soils (mg/kg)

Sample ID	$C_6 – C_{10}$ less BTEXT (F1)	Benzene	Toluene	Ethylbenzene	m + p Xylene	o Xylene
Trip blank / 20201217	<25	<0.2	<0.5	<1	<2	<1

The concentrations of the analytes were all below laboratory detection limits indicating that significant cross contamination had not occurred during the course of the round trip from the site to the laboratory.

Q2.4 Rinsate Blank

The results of a rinsate blank taken during groundwater sampling is presented in Table Q7.

Table Q7: Rinsate Blank Results - water (µg/L)

Sample ID	BTEX	Chloroform	Bromodichloromethane	Dibromochloromethane	Other VOC
R01 / 20200124	<PQL	**2**	**2**	**1**	<PQL

The concentrations of the analytes recorded in the rinsate samples were below the laboratory detection limits with the exception of those in bold. Detection of three VOC compounds was observed at levels at, or just above the PQL. Given the low detected levels and the lack of detection of these species in the recovered groundwater samples it is considered that the decontamination techniques employed during groundwater sampling were adequate and that the risk of cross-contamination was low.

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 Q9.

Table Q9: Data Quality Indicators

Data Quality Indicator	Method(s) of Achievement
Completeness	Planned systematic and selected target locations sampled; Preparation of field logs, sample location plan and chain of custody (COC) records; Preparation of field groundwater sampling sheets; Laboratory sample receipt information received confirming receipt of samples intact and appropriateness of the chain of custody; Samples analysed for contaminants of potential concern (COPC) identified in the Conceptual Site Model (CSM); Completion of COC documentation; NATA endorsed laboratory certificates provided by the laboratory; Satisfactory frequency and results for field and laboratory QC samples as discussed in Section Q2.

Data Quality Indicator	Method(s) of Achievement
Comparability	Using appropriate techniques for sample recovery, storage and transportation, which were the same for the duration of the project; Works undertaken by appropriately experienced and trained DP environmental scientist / engineer; Use of NATA registered laboratories, with test methods the same or similar between laboratories; Satisfactory results for field and laboratory QC samples.
Representativeness	Target media sampled; Spatial and temporal distribution of sample locations; Sample numbers recovered and analysed are considered to be representative of the target media and complying with DQOs; Samples were extracted and analysed within holding times; Samples were analysed in accordance with the analysis request.
Precision	Acceptable RPD between original samples and replicates; Satisfactory results for all other field and laboratory QC samples.
Accuracy	Satisfactory results for all field and laboratory QC samples.

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

Appendix D

Site Assessment Criteria

Site Assessment Criteria

S1. Soil Investigation Levels

S1.1 Health Investigation 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 the adopted HIL and HSL are:

- **HIL-B & HSL-B** - Residential.

Health screening levels for the vapour intrusion pathway have been conservatively adopted.

Table H1 shows the HILs that have been adopted by NEPC (2013) Schedule B1, Table 1A(1). Table S1 only includes contaminants to be analysed during the further investigations, not the full list provided in NEPC (2013).

Table S1: Health Investigation Levels

Contaminant	HIL B (mg/kg)
Metals and Inorganics	
Arsenic	500
Cadmium	150
Chromium (IV)	500
Copper	30,000
Lead	1,200
Mercury (inorganic)	120
Nickel	1,200
Zinc	60,000
PAH	
Carcinogenic PAH (as benzo(a)pyrene TEQ) [1]	4
Total PAH	400
Phenols	
Pentachlorophenol (used as an initial screen)	130
OCP	
DDT + DDD + DDE	600
Aldrin + Dieldrin	10
Chlordane	90
Endosulfan (total)	400
Endrin	20
Hepatchlor	10
HCB	15
Methoxychlor	500
Other Pesticides	
Chlorpyrifos	340
Other Organics	
PCB [2]	1

Notes:

1 Sum of carcinogenic PAH.

2 Non dioxin-like PCBs only.

Table S2 shows petroleum hydrocarbon compounds adopted from NEPC (2013) Schedule B1, Table 1A(3). The HSLs are based on overlying soil type and depth. HSLs for sand have been used based on the sandy clay fill material encountered at the site in the previous boreholes. 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 used.

Table S2: Soil Health Screening Levels for Vapour Intrusion

Contaminant	Soil Type	HSL B (mg/kg)
		Depth 0 m to <1m
Toluene	Sand	160
Ethylbenzene		55
Xylenes		40
Naphthalene		3
Benzene		0.5
TRH C_6-C_{10} less BTEX [F1]		40
TRH >C_{10}-C_{16} less naphthalene [F2]		230

S1.2 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.

The EIL is calculated using the following formula:

EIL = ABC + ACL

The ABC is determined through direct measurement at an appropriate reference site (preferred) or through the use of methods defined by Olszowy et al *Trace element concentrations in soils from rural and urban areas of Australia*, Contaminated Sites monograph no. 4, South Australian Health Commission, Adelaide, Australia 1995 (Olszowy, 1995) or Hamon et al, *Geochemical indices allow estimation of heavy metal background concentrations in soils*, Global Biogeochemical Cycles, vol. 18, GB1014, (Hamon, 2004). ACL is based on the soil characteristics of pH, CEC and clay content.

EIL (and ACLs where appropriate) have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. An *Interactive (Excel) Calculation Spreadsheet* may be used for calculating site-specific EIL for these contaminants, and has been provided in the ASC NEPM Toolbox available on the SCEW (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 S3. 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 9.7 $cmol_c/kg$ and pH of 6.5 with high traffic and clay content of 25%.

Table S3: Ecological Investigation Levels (EIL) in mg/kg

Analyte		EIL Urban residential and public open space	Comments
Metals	Arsenic	100	Adopted averaged pH of 6.5 and CEC of 9.7 $cmol_c/kg$ (refer Appendix E); approximate clay content 10% (refer to borehole logs, Appendix E), low traffic area (NSW).
	Chromium III	410	
	Copper	70	
	Lead	1,100	
	Nickel	160	
	Zinc	470	
PAH	Naphthalene	170	

Ecological Screening Levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. ESL apply to the top 2 m of the soil profile as for EIL.

ESL have been derived in NEPC (2013) for petroleum fractions F1 to F4 as well as BTEX and Benzo(a)pyrene. Site specific data and assumptions as summarised in Table S4 have been used to determine the ESL. The more conservative soil type of coarse sand has been adopted. The adopted ESL, from Table 1B(6), Schedule B1 of NEPC (2013) are shown in Table S5.

Table S4: Inputs to the Derivation of ESL

Variable	Input	Rationale
Depth of ESL application	Top 2 m of the soil profile	The top 0 - 1 m depth below ground level corresponds to the root zone and habitation zone of many species.
Land use	Range of uses	Residential.
Soil Texture	Coarse	Based on most conservative findings noted in test bore logs.

Table S5: Ecological Screening Levels (ESL) in mg/kg

Analyte		ESL (Residential and open space)	Comments
TRH	C6 – C10 (less BTEX) [F1]	180*	All ESLs are low reliability apart from those marked with * which are moderate reliability
	>C10-C16 (less Naphthalene) [F2]	120*	
	>C16-C34 [F3]	300	
	>C34-C40 [F4]	2,800	
BTEX	Benzene	50	
	Toluene	85	
	Ethylbenzene	70	
	Xylenes	105	
PAH	Benzo(a)pyrene	0.7	

S1.3 Management Limits

NEPC (2013) Table 1B(7) provides 'management limits' for TRH fractions, which are applied after consideration of relevant HSLs. The management limits have been adopted to avoid or minimise the following potential effects of petroleum hydrocarbons:

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

The presence of site TRH contamination at the levels of the management limits does not imply that there is no need for administrative notification or controls in accordance with jurisdictional requirements. The adopted management limits are shown in Table S6 and have been selected based on the CSM.

Management limits for coarse material are presented in Table S6, since variable clay textures were encountered in the fill samples collected, and coarse texture management limits are more conservative of the two management limits available.

Table S6: Management Limits for TRH Fractions in Soil

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

S1.4 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;
- Commonly occurring in historical fill containing unsorted demolition materials; and
- Importation of asbestos contaminated building products from China.

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

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

The SAC to be adopted for the assessment of asbestos in the initial further investigation is no asbestos detected at the laboratory reporting limit of 0.1 g/kg.

S1.5 Groundwater

S1.5.1 Groundwater Investigation Levels

The Groundwater Investigation Levels (GIL) adopted in NEPC (2013) are based on*The Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018), default guideline values (DGV) for water quality for marine ecosystems. The 95% Level of Protection (LOP) has been adopted with the exception of contaminants with the potential to bioaccumulate, which have been assessed with reference to the 99% LOP in accordance with the guidance; an

The adopted GIL for the analytes included in the assessment (where applicable), and the corresponding source documents, are shown in Table S7 below.

Contaminant	GIL (µg/L)
Metals and Inorganics	
Arsenic	24/13
Cadmium	0.2
Chromium (IV)	3.3/1
Copper	1.4
Lead	3.4
Mercury (inorganic)	0.06
Nickel	11
Zinc	8
PAH	
anthracene	0.01
benzo(a)pyrene	0.1
naphthalene	16
phenanthrene	0.6
fluoranthene	1
Phenols	
Pentachlorophenol (used as an initial screen)	3.6
OCP	
Aldrin (used as an initial screen)	0.001
Other Pesticides	
Chlorpyrifos(used as an initial screen)	0.01
Other Organics	
PCB (Aroclor 1242 as conservative screen)	0.01

Additional notes regarding selection of GIL including details of the LOP and reliability of the values are provided in Table G5, Appendix G.

S1.5.1 Health Screening Levels - Petroleum Hydrocarbons

The generic HSL for vapour intrusion are published in NEPC (2013), Table S8 summarises the adopted HSL with

Table S8: Groundwater HSL for vapour intrusion

Analyte	HSL A & HSL B (mg/L)	Comments
Toluene	540	Depth of groundwater encountered 4 m +
Ethylbenzene	NL	
Xylenes	170	Sand chosen as the most conservative value given variability of fill encountered
Naphthalene	NL	
Benzene	0.5	
C_6-C_{10} [F1]	200	
>C_{10}-C_{16} [F2]	NL	

Appendix E

Test Logs

Sampling Methods

Douglas Partners

Sampling

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

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

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

Test Pits

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

Large Diameter Augers

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

Continuous Spiral Flight Augers

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

Non-core Rotary Drilling

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

Continuous Core Drilling

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

Standard Penetration Tests

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

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

The test results are reported in the following form.

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

  4,6,7
  N=13

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

  15, 30/40 mm

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

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

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

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

Description and Classification Methods

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

Soil Types

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

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

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

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

Definitions of grading terms used are:

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

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

In fine grained soils (>35% fines)

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

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

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

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

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

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

Soil Descriptions

Cohesive Soils

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

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

Cohesionless Soils

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

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

Soil Origin

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

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

Moisture Condition – Coarse Grained Soils

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

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

Moisture Condition – Fine Grained Soils

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

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

Rock Strength

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

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

Rock Descriptions

Degree of Fracturing

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

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

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Symbols & Abbreviations

Introduction

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

Drilling or Excavation Methods

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

Water

▷	Water seep
▽	Water level

Sampling and Testing

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

Description of Defects in Rock

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

Defect Type

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

Orientation

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

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

Coating or Infilling Term

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

Coating Descriptor

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

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

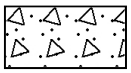
Symbols & Abbreviations

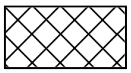
Graphic Symbols for Soil and Rock

General

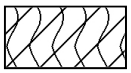

Asphalt

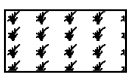

Road base

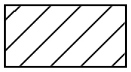

Concrete

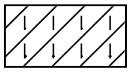

Filling

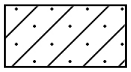
Soils


Topsoil

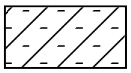

Peat

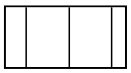

Clay

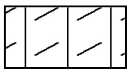

Silty clay

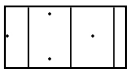

Sandy clay

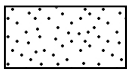

Gravelly clay

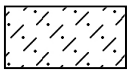

Shaly clay

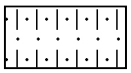

Silt


Clayey silt


Sandy silt

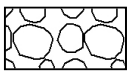

Sand

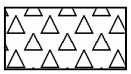

Clayey sand


Silty sand


Gravel

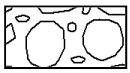

Sandy gravel


Cobbles, boulders

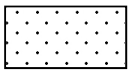

Talus

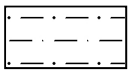
Sedimentary Rocks

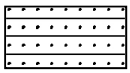

Boulder conglomerate

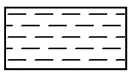

Conglomerate


Conglomeratic sandstone

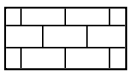

Sandstone


Siltstone

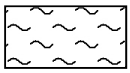

Laminite

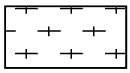

Mudstone, claystone, shale

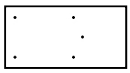

Coal


Limestone

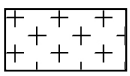
Metamorphic Rocks

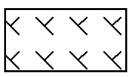

Slate, phyllite, schist

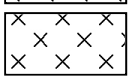

Gneiss

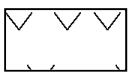

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.3 AHD
EASTING: 312644.4
NORTHING: 6249054.9
DIP/AZIMUTH: 90°/--

BORE No: BH01
PROJECT No: 86819.01
DATE: 17/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
24	0.05	ASPHALTIC CONCRETE		E	0.05		PID< 1 ppm		
	0.2	FILL/Gravelly SAND: fine to coarse, grey-brown, fine to medium igneous gravel, trace clay, dry (roadbase)			0.15				
		FILL/Silty CLAY CI-CI: low to medium plasticity, red-brown, w<PL		E*	0.3		PID< 1 ppm		
	0.6	CLAY CI-CH: medium to high plasticity, red-brown, with silt, w<PL, residual			0.5				
				E	0.8		PID< 1 ppm		
23	1	1.2m: grading to grey mottled red-brown			1.0				1
				E	1.3		PID< 1 ppm		
	1.5	Bore discontinued at 1.5m Target depth reached.			1.5				
22	2								2
21	3								3
20	4								4

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Solid flight auger (TC bit)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56. * Blind duplicate BD1/20191217 taken at 0.15-0.3m

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: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.7 AHD
EASTING: 312676.2
NORTHING: 6249037.8
DIP/AZIMUTH: 90°/--

BORE No: BH02
PROJECT No: 86819.01
DATE: 17/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
23	0.05	ASPHALTIC CONCRETE		E	0.05		PID< 1 ppm		
	0.15	FILL/Gravelly SAND: fine to coarse, grey-brown, fine to medium igneous gravel, trace clay, dry (roadbase)			0.15				
		FILL/Silty CLAY: low to medium plasticity, red-brown mottled grey, with fine gravels, w<PL		E	0.3		PID< 1 ppm		
	0.6				0.5				
		CLAY CL-CI: low to medium plasticity, red-brown, trace fine gravels, w<PL, residual							
		0.80m: grading to grey mottled red-brown		E	0.8		PID< 1 ppm		
1					1.0				1
				E	1.3		PID< 1 ppm		
	1.5	Bore discontinued at 1.5m Target depth reached.			1.5				
22									
2									2
21									
3									3
20									
4									4
19									

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Solid flight auger (TC bit)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.4 AHD
EASTING: 312706.0
NORTHING: 6249018.0
DIP/AZIMUTH: 90°/--

BORE No: BH03
PROJECT No: 86819.01
DATE: 17/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
23	0.05	ASPHALTIC CONCRETE							
	0.1	FILL/Gravelly SAND GW: fine to coarse, grey-brown, fine to medium igneous gravel, trace clay, moist (roadbase)							
		FILL/Sandy CLAY: low plasticity, brown, fine to medium sand, with fine to medium igneous gravels, w<PL		E	0.3		PID< 1 ppm		
	0.5	CLAY CL-CI: low to medium plasticity, red-brown, trace fine gravel, w<PL, residual			0.5				
				E	0.8		PID< 1 ppm		
22	1	1.2m: grading to grey mottled red-brown			1.0				1
				E	1.3		PID< 1 ppm		
					1.5				
				E	1.8		PID< 1 ppm		
21	2	2.0 Bore discontinued at 2.0m Target depth reached.			2.0				2
	3								3
20	4								4
19									

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased
TYPE OF BORING: Solid flight auger (TC bit)
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 22.0 AHD
EASTING: 312743.9
NORTHING: 6249061.4
DIP/AZIMUTH: 90°/--

BORE No: MW01
PROJECT No: 86819.01
DATE: 17/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
22	0	FILL/Gravelly CLAY: low to medium plasticty, red-brown, fine to medium gravel, with silt, trace asbestos fibre cement sheet fragment, w<pl		E*	0.0		PID< 1 ppm		Gatic cover
					0.2				
				E	0.3		PID< 1 ppm		Concrete
	0.6				0.5				
21	1	CLAY CI-CH: medium to high plasticity, red-brown, with silt, w<PL, residual		E	0.8		PID< 1 ppm		
					1.0				
				E	1.3		PID< 1 ppm		
					1.5				
20	2								
	1.9	CLAY CL-CI: low to medium plasticity, brown-grey, with silt, w<PL, residual							
19	3								Bentonite
18	4								
17	5								
16	6								
	6.1	SHALE: grey, apparently low strength, moist, Bringelly Shale							
15	7								
14	8								Gravel
13	9	Below 9.0m: becoming moist to wet							
12	10							▼	
	10.5	Bore discontinued at 10.5m							End Cap
		Target depth reached.							
11	11								
10	12								
9	13								
8	14								

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC bit)

WATER OBSERVATIONS: Free groundwater observed during augering at 10.0m

REMARKS: Location coordinates are in MGA94 Zone 56.

SAMPLING & IN SITU TESTING LEGEND

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

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.4 AHD
EASTING: 312724.6
NORTHING: 6248977.2
DIP/AZIMUTH: 90°/--

BORE No: MW02
PROJECT No: 86819.01
DATE: 18/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
23	0.0	FILL/Silty CLAY: medium to high plasticity, brown, with fine to medium gravel, trace ceramic tile, w<PL		E*	0.0		PID < 1 ppm		Flush gatic cover
					0.2				
				E	0.3		PID < 1 ppm		Concrete
	0.65	CLAY CL-Cl: low to medium plasticity, red-brown mottled grey, trace fine to medium gravel, w<PL, residual			0.5				
22	1			E	0.8		PID < 1 ppm		
					1.0				
				E	1.3		PID < 1 ppm		
21	2	Below 2.0m: grading to grey mottled red-brown			1.5				
	2.8	CLAY CL-Cl: low to medium plasticity, brown, with silt and fine to medium gravels, moist, residual (possibly extremely low strength shale)							Bentonite
20	3								
19	4								
18	5								
	5.0	SHALE: grey-brown, apparently low strength, moist, Bringelly Shale							
17	6								
16	7								Gravel
15	8								
14	9								
13	10								End Cap
	10.5	Bore discontinued at 10.5m Target depth reached.							
12	11								
11	12								
10	13								
9	14								

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC bit)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. * Blind duplicate BD2/20191217 taken at 0-0.2m

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: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.2 AHD
EASTING: 312624.9
NORTHING: 6249088.9
DIP/AZIMUTH: 90°/--

BORE No: MW03
PROJECT No: 86819.01
DATE: 18/12/2019
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
24		FILL/CLAY: low plasticity, pale brown, with silt and fine to coarse gravel, trace concrete fragments and sand, w<PL		E	0.0		PID< 1 ppm		Flush gatic cover
				E	0.2 0.3		PID< 1 ppm		Concrete
23	1				0.5				
				E	0.8 1.0		PID< 1 ppm		
				E	1.3 1.5		PID< 1 ppm		
22	2								
				E	2.3 2.5		PID< 1 ppm		
21	3			E	2.8 3.0		PID< 1 ppm		Bentonite
20	4								
				E	4.3 4.5		PID< 1 ppm		
19	5	5.0 SHALE, grey, apparently low strength, moist, Bringelly Shale							
				E	5.8 6.0		PID< 1 ppm		
18	6								
17	7								
16	8								Gravel
15	9								
14	10	10.5 Bore discontinued at 10.5m Target depth reached.							End Cap
13	11								
12	12								
11	13								
10	14								

RIG: Geoprobe (Truck Mounted) **DRILLER:** Terratest **LOGGED:** JJH **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC bit)

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. * Blind duplicate BD1/20191218 taken at 0-0.2m

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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TEST PIT LOG

CLIENT: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 25.2 AHD
EASTING: 312653.1
NORTHING: 6248983.8

PIT No: TP09
PROJECT No: 86819.01
DATE: 26/11/2019
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)
25	0.0	FILL/Silty CLAY: low plasticity, brown, trace sand and rootlets, w<PL		E*	0.0		PID< 1 ppm		
	0.3	CLAY CI-CH: medium to high pasticity, red-brown mottled grey, with silt, trace rootlets, w<PL, residual		E	0.3		PID< 1 ppm		
24	1	Below 1.20m: grading to grey mottled red-orange			0.5				1
	1.4	Pit discontinued at 1.4m Target depth reached.							
23	2								2
22	3								3
21	4								4

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

RIG: 5 tonne Excavator (600 mm bucket)

LOGGED: JJH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: * Blind duplicate BD1/20191126 taken at 0-0.3m

☐ 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: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 24.7 AHD
EASTING: 312669.9
NORTHING: 6248982.2

PIT No: TP10
PROJECT No: 86819.01
DATE: 26/11/2019
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)
24	0.0	FILL/Silty CLAY: low plasticity, grey-brown, trace sand and rootlets, w<PL		E	0.0		PID< 1 ppm		
	0.3	CLAY CI-CH: medium to high pasticity, red-brown mottled grey, trace rootlets and fine gravel, w<PL, residual		E	0.3		PID< 1 ppm		
	0.5				0.5				
	1	Below 1.1m: grading to grey mottled red-orange							
	1.4	Pit discontinued at 1.4m Target depth reached.							
23	2								
22	3								
21	4								
20									

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

RIG: 5 tonne Excavator (600 mm bucket)

LOGGED: JJH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

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: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 22.6 AHD
EASTING: 312680.5
NORTHING: 6249106.7

PIT No: TPA
PROJECT No: 86819.01
DATE: 26/11/2019
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)
22	0	FILL/CLAY CL-CI: low to medium pasticity, grey-brown, with silt, trace gravel, rootlets, brick, ceramic tile and concrete fragments, w<PL							
21	1	Below 1.6m: grading to brown							
20	2								
19	3								
18	4	4.0 FILL/CLAY CI-CH: medium to high plasticity, grey mottled orange-red, w<PL (possibly residual)							
		4.1 Pit discontinued at 4.1m Target depth reached.							

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

RIG: 5 tonne Excavator (600 mm bucket)

LOGGED: JJH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

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: New South Wales Land and Housing Corporation
PROJECT: Villawood, Kamira Court, DSI
LOCATION: Kamira Court, Villawood

SURFACE LEVEL: 23.8 AHD
EASTING: 312709.5
NORTHING: 6248994.5

PIT No: TPB
PROJECT No: 86819.01
DATE: 26/11/2019
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)
23	0	FILL/CLAY CL-CI: low to medium pasticity, grey-brown mottled red-orange, with silt, trace gravel, rootlets, wood, brick and ceramic tile fragments, w<PL							
	1.7								
22	1.8	CLAY CI-CH: medium to high plasticity, grey mottled red-orange, with silt, w<PL, residual							
		Pit discontinued at 1.8m Target depth reached.							
21	2								
20	3								
19	4								

RIG: 5 tonne Excavator (600 mm bucket)

LOGGED: JJH

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

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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Appendix F

Groundwater Field Sheets

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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:	MW1
Project Name:	Villawood
Project Number:	86819.01
Site Location:	
Bore GPS Co-ord:	
Installation Date:	17.11.15
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	18.11.19
Purged By:	JSH
GW Level (pre-purge):	7.4 m bgl
GW Level (post-purge):	10.5 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	10.5 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) DRY
Equipment:	WQM, int meter

Micropurge and Sampling Details	
Date/Time:	24.11.20
Sampled By:	JSH
Weather Conditions:	Overcast
GW Level (pre-purge):	7 m bgl
GW Level (post sample):	7.5 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	10.5 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	~4 L
Equipment:	WQM, int. meter, peri pump

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**
0900	22.8	3.78	3.9	6.11	2895	115
0901	22.7	2.50	4.1	6.04	2206	99
0902	22.3	1.61	8.2	5.77	1571	86
0903	22.2	1.26	7.1	5.68	1271	75
0904	22.2	1.03	6.5	5.54	1151	72
0905	22.2	0.91	6.2	5.53	1050	71
0906	22.2	0.86	6.1	5.51	980	70

Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	8-9 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	pale grey-brown
Sample ID:	
QA/QC Samples:	BD1/20201124
Sampling Containers and filtration:	as MW2
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:	MW2
Project Name:	VILLAWOOD
Project Number:	86819.01
Site Location:	
Bore GPS Co-ord:	
Installation Date:	14.12.18
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	18.12.18
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:	07:30
Sampled By:	JSM
Weather Conditions:	Overcast + Smoke haze
GW Level (pre-purge):	8.1 m bgl
GW Level (post sample):	8.8 m bgl
PSH observed:	Yes / No (interface / visual). Thickness if observed:
Observed Well Depth:	8.9 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	— L
Equipment:	

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**
	NO PARAMETERS					
			INSUFFICIENT VOLUME			
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	8-9 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	pale grey-brown
Sample ID:	MW2
QA/QC Samples:	—
Sampling Containers and filtration:	2x Ambers 3x Vials 1x Red (filtered) 1x Plastic (unfiltered) 1x Plastic
Comments / Observations:	Very silty (shale cuttings)

HM, TRH, BTEX, PAH, OCP/PCB, Phenols, VOC
pH Hardness
Replicate HM, VOC VOC - trip Safe

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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:	MW3
Project Name:	8689.01
Project Number:	Ulladulla
Site Location:	
Bore GPS Co-ord:	
Installation Date:	18.12.19
GW Level (during drilling):	- m bgl
Well Depth:	m bgl
Screened Interval:	m bgl
Contaminants/Comments:	-

Bore Development Details	
Date/Time:	18.12.19
Purged By:	
GW Level (pre-purge):	8.6 m bgl
GW Level (post-purge):	9 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	9 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	(target: no drill mud, min 3 well vol. or dry) DRY
Equipment:	Tweflo pump, int meter

Micropurge and Sampling Details	
Date/Time:	24.1.20
Sampled By:	JSH
Weather Conditions:	overcast
GW Level (pre-purge):	8.55 m bgl
GW Level (post sample):	9.1 m bgl
PSH observed:	Yes / (No) (interface / visual). Thickness if observed:
Observed Well Depth:	9.2 m bgl
Estimated Bore Volume:	L
Total Volume Purged:	L
Equipment:	WQM, int meter, peri pump

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**
		NO PARAMETERS				
		INSUFFICIENT				
		VOLUME				
Additional Readings Following stabilisation:	DO % Sat	SPC	TDS			

Sample Details

Sampling Depth (rationale):	8.6-9.2 m bgl,
Sample Appearance (e.g. colour, siltiness, odour):	brown to pale grey-brown
Sample ID:	MW3
QA/QC Samples:	
Sampling Containers and filtration:	2x Amber 1x Pump 3x Vials 1x Red (F) 1x Hydrochloric Acid
Comments / Observations:	-

Appendix G

Summary Laboratory Results

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Table G1a: Summary of Laboratory Results – Metals, TRH, BTEX, PAH

			Metals								TRH						BTEX				PAH			
			Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene [b]	Benzo(a)pyrene (BaP)	Benzo(a)pyrene TEQ	Total PAHs
		PQL	4	0.4	1	1	1	0.1	1	1	25	50	25	50	100	100	0.2	0.5	1	1	1	0.05	0.5	0.05
Sample ID	Depth	Sampled Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MW1	0 - 0.2m	17/12/2019	5	<0.4	11	27	11	<0.1	5	34	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BD3/20191217	0m	17/12/2019	6	<0.4	14	23	14	<0.1	8	45	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW1	0.3 - 0.5m	17/12/2019	6	<0.4	16	19	14	<0.1	5	27	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW2	0 - 0.2m	17/12/2019	4	<0.4	14	25	15	<0.1	15	55	<25	<50	<25	<50	140	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW2	0.3 - 0.5m	17/12/2019	7	<0.4	16	9	12	<0.1	3	11	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW2	0.8 - 1m	17/12/2019	5	<0.4	14	14	13	<0.1	4	21	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
A1	0-0.2m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW3	0 - 0.2m	17/12/2019	8	<0.4	9	30	14	<0.1	13	62	<25	61	<25	61	200	110	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW3	0.8 - 1m	17/12/2019	4	<0.4	11	25	14	<0.1	8	50	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH1	0.05 - 0.15m	17/12/2019	<4	<0.4	55	47	5	<0.1	59	43	<25	62	<25	62	240	380	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	0.2
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH1	0.3 - 0.5m	17/12/2019	5	<0.4	29	17	11	<0.1	18	22	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH1	0.8 - 1m	17/12/2019	<4	<0.4	29	76	6	<0.1	33	33	<25	64	<25	64	740	1100	<0.2	<0.5	<1	<1	<1	0.05	<0.5	0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH2	0.05 - 0.15m	17/12/2019	5	<0.4	15	15	11	<0.1	5	18	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH2	0.3 - 0.5m	17/12/2019	5	<0.4	32	28	10	<0.1	25	26	<25	54	<25	54	360	400	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH2	0.8 - 1m	17/12/2019	8	<0.4	11	22	13	<0.1	4	23	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH3	0.3 - 0.5m	17/12/2019	8	<0.4	31	19	23	<0.1	13	26	<25	64	<25	64	200	180	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BH3	0.8 - 1m	17/12/2019	5	<0.4	14	16	10	<0.1	5	14	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
MW1 - [TRIPLICATE]	0 - 0.2m	17/12/2019	5	<0.4	13	21	13	<0.1	5	29	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
TP9	0 - 0.3m	26/11/2019	10	<0.4	59	24	32	<0.1	10	46	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
BD1/20191126	0m	26/11/2019	11	<0.4	110	42	39	0.2	7	68	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
TP9	0.3 - 0.5m	26/11/2019	9	<0.4	28	16	18	<0.1	5	26	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
TP10	0 - 0.3m	26/11/2019	6	<0.4	23	15	45	<0.1	7	55	<25	<50	<25	<50	110	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
TP10	0.3 - 0.5m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<1	<0.05	<0.5	<0.05
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC
ACM-2	-	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
			500 100	150 NC	500 410	30000 70	1200 1100	120 NC	1200 160	60000 470	NC NC	NC NC	45 180	110 120	NC 300	NC 2800	0.5 50	160 85	55 70	40 105	3 170	NC 0.7	4 NC	400 NC

Lab result
HIL/HSL value EIL/ESL value

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

Indicates that asbestos has been detected by the lab below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL B (Residential / Low - High Density), HSL A/B (Residential / Low - High Density), DC HSL B (Direct contact HSL B Residential (High density))
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential and Public Open Space), ESL UR/POS (Urban Residential and Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential, Parkland and Public Open Space)
a	QA/QC replicate of sample listed directly below the primary sample
b	reported naphthalene laboratory result obtained from BTEXN suite
c	criteria applies to DDT only

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Table G2b: Summary of Laboratory Results – Phenol, OCP, OPP, PCB, Asbestos, Asbestos

			Phenol	OCP												OPP	PCB	Abestos	
			Phenol	DDT+DDE+DDD c	DDD	DDE	DDT	Aldrin & Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	HCB	Methoxychlor		Chlorpyriphos	Total PCB	Asbetsos ID	FA and AF Estimation
		PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1		<0.001
Sample ID	Depth	Sampled Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	g	%(w/w)
MW1	0 - 0.2m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BD3/20191217	0m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW1	0.3 - 0.5m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW2	0 - 0.2m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW2	0.3 - 0.5m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW2	0.8 - 1m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
A1	0m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	**Detected**	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW3	0 - 0.2m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW3	0.8 - 1m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH1	0.05 - 0.15m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH1	0.3 - 0.5m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH1	0.8 - 1m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH2	0.05 - 0.15m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH2	0.3 - 0.5m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH2	0.8 - 1m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH3	0.3 - 0.5m	17/12/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BH3	0.8 - 1m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
MW1 - [TRIPLICATE]	0 - 0.2m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
TP9	0 - 0.3m	26/11/2019	<5	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
BD1/20191126	0m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
TP9	0.3 - 0.5m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NAD	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
TP10	0 - 0.3m	26/11/2019	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
TP10	0.3 - 0.5m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	NT	<0.001
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		
ACM-2	0m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT		NT	NT	**Detected**	NT
			130 NC	600 180	NC NC	NC NC	NC 180	10 NC	90 NC	400 NC	20 NC	10 NC	15 NC	500 NC		340 NC	1 NC		

Lab result
HIL/HSL value EIL/ESL value

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

Indicates that asbestos has been detected by the lab below the PQL, refer to the lab report **Blue** = DC exceedance

Bold = Lab detections NT = Not tested NL = Non limiting NC = No criteria NA = Not applicable NAD = No asbestos detected

Notes:

HIL/HSL/DC	NEPC, Schedule B1 - HIL B (Residential / Low - High Density), HSL A/B (Residential / Low - High Density), DC HSL B (Direct contact HSL B Residential (Higl
EIL/ESL	NEPC, Schedule B1 - EIL UR/POS (Urban Residential and Public Open Space), ESL UR/POS (Urban Residential and Public Open Space)
ML	NEPC, Schedule B1 - ML R/P/POS (Residential, Parkland and Public Open Space)
a	QA/QC replicate of sample listed directly below the primary sample
b	reported naphthalene laboratory result obtained from BTEXN suite
c	criteria applies to DDT only

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Table 3: Summary of Laboratory Results – Metals, TRH, BTEX, PAH, Phenol, OCP, OPP, PCB, Asbestos

			Metals							TRH		BTEX						PAH															Phenol	OCP		OPP	PCB	Asbestos											
			Arsenic	Cadmium	Total Chromium	Total Chromium (T1/2*)	Lead	Mercury (inorganic)	Nickel	TRH C6 - C9	C10-C36 (sum of total fractions)	Benzene	Toluene	Ethylbenzene	m+p-Xylene	o-Xylene	Xylenes (total)	Benzo(a)pyrene (BaP)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	Phenol	Total Endosulfan	Total Analysed OCP	Total Analysed OPP	Total PCB	Asbestos ID in soil >0.1g/kg	Trace Analysis	Asbestos ID in soil <0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis	ACM >7mm Estimation	FA or AF Estimation	PA and AF Estimation	Total Asbestos*	Asbestos ID in materials	Total Asbestos
		PQL	4	0.4	1	0.01	1	0.1	1	25	50	0.2	0.5	1	2	1	3	0.05	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1	0.1	0.1	0.05	5	0.1	0.1	0.1	0.1								<0.001	<0.1	-	0.001
Sample ID	Depth	Sampled Date	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	-	-	-	g	g	%(w/w)	g/kg	-	-
MW1	0 - 0.2m	17/12/2019	5	<0.4	11	NT	11	<0.1	5	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BD3/20191217	0m	17/12/2019	6	<0.4	14	NT	14	<0.1	8	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW1	0.3 - 0.5m	17/12/2019	6	<0.4	16	NT	14	<0.1	5	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW2	0 - 0.2m	17/12/2019	4	<0.4	14	NT	15	<0.1	15	<25	160	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW2	0.3 - 0.5m	17/12/2019	7	<0.4	16	NT	12	<0.1	3	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW2	0.8 - 1m	17/12/2019	5	<0.4	14	NT	13	<0.1	4	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
A1	0m	17/12/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW3	0 - 0.2m	17/12/2019	8	<0.4	9	NT	14	<0.1	13	<25	334	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW3	0.8 - 1m	17/12/2019	4	<0.4	11	NT	14	<0.1	8	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH1	0.05 - 0.15m	17/12/2019	<4	<0.4	55	NT	5	<0.1	59	<25	448	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	0.2	<0.1	0.2	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH1	0.3 - 0.5m	17/12/2019	5	<0.4	29	NT	11	<0.1	18	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH1	0.8 - 1m	17/12/2019	<4	<0.4	29	NT	6	<0.1	33	<25	1199	<0.2	<0.5	<1	<2	<1	<3	0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH2	0.05 - 0.15m	17/12/2019	5	<0.4	15	NT	11	<0.1	5	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH2	0.3 - 0.5m	17/12/2019	5	<0.4	32	NT	10	<0.1	25	<25	581	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH2	0.8 - 1m	17/12/2019	8	<0.4	11	NT	13	<0.1	4	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH3	3 - 0.5m	17/12/2019	8	<0.4	31	NT	23	<0.1	13	<25	361	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BH3	0.8 - 1m	17/12/2019	5	<0.4	14	NT	10	<0.1	5	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW1 - [TRIPLICATE]	0 - 0.2m	17/12/2019	5	<0.4	13	NT	13	<0.1	5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TP9	0 - 0.3m	26/11/2019	10	<0.4	59	NT	32	<0.1	10	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
BD1/20191126	0m	26/11/2019	11	<0.4	110	<0.01	39	0.2	7	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TP9	0.3 - 0.5m	26/11/2019	9	<0.4	28	NT	18	<0.1	5	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TP10	0 - 0.3m	26/11/2019	6	<0.4	23	NT	45	<0.1	7	<25	100	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	<5	<0.1	<0.1	<0.1	<0.1	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TP10	0.3 - 0.5m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	<25	<50	<0.2	<0.5	<1	<2	<1	<3	<0.05	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	<0.05	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
ACM-2	0m	26/11/2019	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Waste Classification Criteria																																																	
CT1 (mg/kg)			100	20	100	N/A	100	4	40	650	10000	10	288	600	N/A	N/A	1000	0.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	200	288	60	50	4	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCC1 (mg/kg)			500	100	1900	N/A	1500	50	1050	650	10000	18	518	1080	N/A	N/A	1800	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	200	518	108	50	7.5	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCLP1 (mg/L)			N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CT2 (mg/kg)			400	80	400	N/A	400	16	160	2600	40000	40	1152	2400	N/A	N/A	4000	3.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	800	1152	240	50	16	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCC2(mg/kg)			2000	400	7600	N/A	6000	200	4200	2600	40000	72	2073	4320	N/A	N/A	7200	23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	800	2073	432	50	30	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCLP2 (mg/L)			N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

NT = Not tested NC = No criteria AD = Asbestos detected NAD = No asbestos detected

Notes:

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

Douglas Partners
Geotechnics / Environment / Groundwater

Table G3 - ENM Assessment (All results in mg/kg unless otherwise stated)

Test Pit/ Sample ID	Depth (m)	Sampling Date	Soil Type	Metals								PAH		TRH	BTEX				pH *	Electrical Conductivity (dS/m)	Foreign Materials - RTA276 ENM (%)
				Arsenic	Cadmium	Chromium (Total)	Copper	Lead	Mercury	Nickel	Zinc	Benzo(a) Pyrene (BaP)	Total PAH	C10-C36	Benzene	Toluene	Ethylbenzene	Xylenes			
PQL				4	0.4	1	1	1	0.1	1	1	0.05	0.05	<250	0.2	0.5	1	3	-	0.001	0.05
ENM Order (NSW EPA 2014)																					
Maximum Average Concentration				20	0.5	75	100	50	0.5	30	150	0.5	20	250	-	-	-	-	5-9	1.5	0.05
Absolute Maximum Concentration				40	1	150	200	100	1	60	300	1	40	500	0.5	65	25	15	4.5-10	3	0.1
Stockpile Sampling - November 2019																					
SPA-1 C	-	26/11/2019	Fill	4	<0.4	9	37	15	<0.1	20	80	-	-	-	-	-	-	-	9.1	0.22	<0.05
SPA-1 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
SPA-2 C	-	26/11/2019	Fill	5	<0.4	10	39	23	<0.1	35	110	-	-	-	-	-	-	-	9.2	0.17	<0.05
SPA-2 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
SPA-3 C	-	26/11/2019	Fill	6	<0.4	11	39	18	<0.1	24	98	-	-	-	-	-	-	-	9.2	0.28	<0.05
SPA-3 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
SPB-1 C	-	26/11/2019	Fill	8	<0.4	10	31	23	<0.1	18	69	-	-	-	-	-	-	-	8.4	0.31	<0.05
SPB-1 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
SPB-2 C	-	26/11/2019	Fill	9	<0.4	8	31	18	<0.1	21	79	-	-	-	-	-	-	-	8.3	0.31	<0.05
SPB-2 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
SPB-3 C	-	26/11/2019	Fill	7	<0.4	9	25	15	<0.1	17	56	-	-	-	-	-	-	-	8.4	0.23	<0.05
SPB-3 D	-	26/11/2019	Fill	-	-	-	-	-	-	-	-	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	-	-	-
Average				<4	<0.4	9.5	33.7	18.7	<0.1	22.5	82	<0.05	<0.05	<250	<0.2	<0.5	<1	<3	8.77	0.25	<0.05

NSW EPA (2014) Waste Classification Guidelines - Part 1: Classifying Waste

a Duplicate sample is listed below primary sample
NAD Not detected at the laboratory reporting limit of 0.1g/kg
* Ranges given for pH are for the minimum and maximum acceptable pH values
<PQL All group analytes below practical quantification limit

Table F3: Summary of Laboratory Results for Groundwater Analysis

Sample ID	Depth [d]	Date Sampled	TRH						TPH			BTEX					VOC				PAH						Total Phenols	Priority Heavy Metals (total dissolved)							
			TRH C_6 - C_{10}	TRH $>C_{10}$ - C_{16}	C6-C10 less BTEX (F1)	>C10-C16 less Naphthalene (F2)	>C16-C34	>C34-40	>C10-C16 (SGC)	> C16-C34 (SGC)	>C34-C40 (SGC)	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Chloroform	PCE	Other VOC	Naphthalene	BaP	BaP TEQ	Anthracene	Phenanthrene	Fluoranthene	Total PAH		As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
	m bgl		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Groundwater Investigation Levels																																		
HSL (NEPC 2013)			200	NL	-	-	-	-	-	-	-	0.5	540	-	170	170	-	-	-	NL	-	-	-	-	-	-	-	-		-		-	-	-	-
GIL - fresh water (ANZG 2018)			-	-	-	-	-	-	-	-	-	950	180 [g]	80 [g]	*75 / 200* [h, g]	*350* [g]	370 [g]	-	-	16	*0.1* [g, i]	-	*0.01* [g, i]	*0.6* [g, i]	*1* [g, i]	-	3.6 [f, i]	*24/13* [e, g]	0.2	3.3/ 1 [b]	1.4	3.4	0.06 [l]	11	8
Laboratory Results																																		
MW1	7	24/1/20	<10	<50	<10	<50	<100	<100	-	-	-	<1	<1	<1	<2	<1	<1	<1	<PQL	<1	<1	<5	<1	<1	<1	NIL +VE	<0.05	<1	0.2	<1	1	<1	<0.05	16	23
BD1/20200124	7	24/1/20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<PQL	<1	-	-	-	-	-	-	-	<1	0.1	<1	<1	<1	<0.05	15	15
MW2	8.1	24/1/20	<10	600	<10	600	970	<100	420	660	<100	<1	<1	<1	<2	<1	<1	<1	<PQL	<1	<1	<5	<1	3	<1	4.7	<0.05	3	0.6	<1	2	<1	<0.05	29	67
MW3	8.55	24/1/20	<10	1700	<10	1700	2500	300	1200	1700	190	<1	<1	<1	<2	<1	<1	<1	<PQL	<1	2	<5	<1	9	<1	22	<0.05	4	<0.1	<1	<1	<1	<0.05	<1	3

Notes:

a	Laboratory replicate sample of sample listed directly above
b	given in order of Cr(VI) / Cr(III)
c	Threshold value for Cr (VI)
d	Depth to groundwater as measured immediately prior to sampling
e	Given in order As(III)/ As(V)
f	threshold for pentachlorophenol as a conservative screen
g	ANZG DGV of unknown reliability
h	m-xylene threhold of 75ug/L, p-xylene threshold of 200ug/L adopted from freshwater figure
i	99% LOP adopted due to the potential for bioaccumulation
j	threshold for aldrin as a conservative screen
k	threshold for chlorpyrifos adopted as an initial screen
l	threshold for Aroclor 1242 as a conservative screen
-	Not defined/ not analysed/ not applicable
italics	ANZG DGV of unknown reliability
BOLD	Concentration Detected at or above the PQL
BOLD	Exceeds GIL or HSL

Abbreviations

ADWG	Australian Drinking Water Guideline
As	arsenic
BaP	benzo(a)pyrene
BTEX	benzene, toluene, ethyl benzene, total xylenes
Cd	cadmium
Cr	chromium
Cu	copper
GIL	groundwater investigation level
Hg	mercury
Ni	nickel
PAH	polycyclic aromatic hydrocarbons
Pb	lead
PQL	practical quantitation limit
TRH	total recoverable hydrocarbons, including total petroleum hydrocarbons (TPH)
VOC	volatile organic compounds
Zn	zinc
SGC	Silica gel cleanup

Appendix H

Laboratory Documentation

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CERTIFICATE OF ANALYSIS 231726

Client Details

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

Sample Details

Your Reference	**86819.01, Villawood**
Number of Samples	17 SOIL, 1 MATERIAL
Date samples received	27/11/2019
Date completed instructions received	27/11/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	04/12/2019
Date of Issue	02/12/2019

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Lucy Zhu, Senior Asbestos Analyst
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		231726-1	231726-2	231726-3	231726-4	231726-6
Your Reference	UNITS	TP9	TP9	TP10	TP10	SPA-1 D
Depth		0-0.3	0.3-0.5	0-0.3	0.3-0.5	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	80	84	84	72	90

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		231726-8	231726-10	231726-12	231726-14	231726-16
Your Reference	UNITS	SPA-2 D	SPA-3 D	SPB-1 D	SPB-2 D	SPB-3 D
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	76	79	87	77	81

vTRH(C6-C10)/BTEXN in Soil		
Our Reference		231726-17
Your Reference	UNITS	BD1/20191126
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date extracted	-	28/11/2019
Date analysed	-	28/11/2019
TRH C_6 - C_9	mg/kg	<25
TRH C_6 - C_{10}	mg/kg	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Total +ve Xylenes	mg/kg	<3
Surrogate aaa-Trifluorotoluene	%	86

svTRH (C10-C40) in Soil						
Our Reference		231726-1	231726-2	231726-3	231726-4	231726-6
Your Reference	UNITS	TP9	TP9	TP10	TP10	SPA-1 D
Depth		0-0.3	0.3-0.5	0-0.3	0.3-0.5	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	110	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	110	<50	<50
Surrogate o-Terphenyl	%	88	86	78	84	84

svTRH (C10-C40) in Soil						
Our Reference		231726-8	231726-10	231726-12	231726-14	231726-16
Your Reference	UNITS	SPA-2 D	SPA-3 D	SPB-1 D	SPB-2 D	SPB-3 D
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	82	82	85	83	84

svTRH (C10-C40) in Soil		
Our Reference		231726-17
Your Reference	UNITS	BD1/20191126
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date extracted	-	28/11/2019
Date analysed	-	29/11/2019
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	86

PAHs in Soil						
Our Reference		231726-1	231726-2	231726-3	231726-4	231726-6
Your Reference	UNITS	TP9	TP9	TP10	TP10	SPA-1 D
Depth		0-0.3	0.3-0.5	0-0.3	0.3-0.5	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	84	84	83	83	82

PAHs in Soil						
Our Reference		231726-8	231726-10	231726-12	231726-14	231726-16
Your Reference	UNITS	SPA-2 D	SPA-3 D	SPB-1 D	SPB-2 D	SPB-3 D
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	83	84	83	83	83

PAHs in Soil		
Our Reference		231726-17
Your Reference	UNITS	BD1/20191126
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date extracted	-	28/11/2019
Date analysed	-	29/11/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	84

Organochlorine Pesticides in soil			
Our Reference		231726-1	231726-3
Your Reference	UNITS	TP9	TP10
Depth		0-0.3	0-0.3
Date Sampled		26/11/2019	26/11/2019
Type of sample		SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019
alpha-BHC	mg/kg	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	0.1	<0.1
Surrogate TCMX	%	81	79

Organophosphorus Pesticides in Soil			
Our Reference		231726-1	231726-3
Your Reference	UNITS	TP9	TP10
Depth		0-0.3	0-0.3
Date Sampled		26/11/2019	26/11/2019
Type of sample		SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	81	79

PCBs in Soil			
Our Reference		231726-1	231726-3
Your Reference	UNITS	TP9	TP10
Depth		0-0.3	0-0.3
Date Sampled		26/11/2019	26/11/2019
Type of sample		SOIL	SOIL
Date extracted	-	28/11/2019	28/11/2019
Date analysed	-	29/11/2019	29/11/2019
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCMX	%	81	79

Acid Extractable metals in soil						
Our Reference		231726-1	231726-2	231726-3	231726-5	231726-7
Your Reference	UNITS	TP9	TP9	TP10	SPA-1 C	SPA-2 C
Depth		0-0.3	0.3-0.5	0-0.3	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Arsenic	mg/kg	10	9	6	4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	59	28	23	9	10
Copper	mg/kg	24	16	15	37	39
Lead	mg/kg	32	18	45	15	23
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	10	5	7	20	35
Zinc	mg/kg	46	26	55	80	110

Acid Extractable metals in soil						
Our Reference		231726-9	231726-11	231726-13	231726-15	231726-17
Your Reference	UNITS	SPA-3 C	SPB-1 C	SPB-2 C	SPB-3 C	BD1/20191126
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Arsenic	mg/kg	6	8	9	7	11
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	10	8	9	110
Copper	mg/kg	39	31	31	25	42
Lead	mg/kg	18	23	18	15	39
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Nickel	mg/kg	24	18	21	17	7
Zinc	mg/kg	98	69	79	56	68

Misc Soil - Inorg			
Our Reference		231726-1	231726-3
Your Reference	UNITS	TP9	TP10
Depth		0-0.3	0-0.3
Date Sampled		26/11/2019	26/11/2019
Type of sample		SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019
Total Phenolics (as Phenol)	mg/kg	<5	<5

Misc Inorg - Soil						
Our Reference		231726-5	231726-7	231726-9	231726-11	231726-13
Your Reference	UNITS	SPA-1 C	SPA-2 C	SPA-3 C	SPB-1 C	SPB-2 C
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
pH 1:5 soil:water	pH Units	9.1	9.2	9.2	8.4	8.3
Electrical Conductivity 1:5 soil:water	µS/cm	220	170	280	310	310

Misc Inorg - Soil		
Our Reference		231726-15
Your Reference	UNITS	SPB-3 C
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date prepared	-	29/11/2019
Date analysed	-	29/11/2019
pH 1:5 soil:water	pH Units	8.4
Electrical Conductivity 1:5 soil:water	µS/cm	230

Moisture						
Our Reference		231726-1	231726-2	231726-3	231726-4	231726-5
Your Reference	UNITS	TP9	TP9	TP10	TP10	SPA-1 C
Depth		0-0.3	0.3-0.5	0-0.3	0.3-0.5	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Moisture	%	7.2	12	7.6	11	11

Moisture						
Our Reference		231726-6	231726-7	231726-8	231726-9	231726-10
Your Reference	UNITS	SPA-1 D	SPA-2 C	SPA-2 D	SPA-3 C	SPA-3 D
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Moisture	%	11	13	13	12	13

Moisture						
Our Reference		231726-11	231726-12	231726-13	231726-14	231726-15
Your Reference	UNITS	SPB-1 C	SPB-1 D	SPB-2 C	SPB-2 D	SPB-3 C
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019	28/11/2019	28/11/2019	28/11/2019
Moisture	%	12	12	11	11	11

Moisture			
Our Reference		231726-16	231726-17
Your Reference	UNITS	SPB-3 D	BD1/20191126
Depth		-	-
Date Sampled		26/11/2019	26/11/2019
Type of sample		SOIL	SOIL
Date prepared	-	28/11/2019	28/11/2019
Date analysed	-	28/11/2019	28/11/2019
Moisture	%	12	5.2

Asbestos ID - soils NEPM				
Our Reference		231726-1	231726-3	231726-4
Your Reference	UNITS	TP9	TP10	TP10
Depth		0-0.3	0-0.3	0.3-0.5
Date Sampled		26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL
Date analysed	-	02/12/2019	02/12/2019	02/12/2019
Sample mass tested	g	1,120.98	1,044.2	1,125.11
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–
FA and AF Estimation*	g	–	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001

Asbestos ID - soils		
Our Reference		231726-2
Your Reference	UNITS	TP9
Depth		0.3-0.5
Date Sampled		26/11/2019
Type of sample		SOIL
Date analysed	-	02/12/2019
Sample mass tested	g	Approx. 30g
Sample Description	-	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Asbestos ID - materials		
Our Reference		231726-18
Your Reference	UNITS	ACM-2
Depth		-
Date Sampled		26/11/2019
Type of sample		MATERIAL
Date analysed	-	28/11/2019
Mass / Dimension of Sample	-	70x60x4mm
Sample Description	-	Beige fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected
Trace Analysis	-	Not Tested

RTA276 ENM* Foreign Material						
Our Reference		231726-5	231726-7	231726-9	231726-11	231726-13
Your Reference	UNITS	SPA-1 C	SPA-2 C	SPA-3 C	SPB-1 C	SPB-2 C
Depth		-	-	-	-	-
Date Sampled		26/11/2019	26/11/2019	26/11/2019	26/11/2019	26/11/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
Date analysed	-	29/11/2019	29/11/2019	29/11/2019	29/11/2019	29/11/2019
Sample Mass Tested	g	5,000	4,500	3,200	4,500	5,300
Foreign Material	%	<0.05	<0.05	<0.05	<0.05	<0.05

RTA276 ENM* Foreign Material		
Our Reference		231726-15
Your Reference	UNITS	SPB-3 C
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date prepared	-	29/11/2019
Date analysed	-	29/11/2019
Sample Mass Tested	g	4,300
Foreign Material	%	<0.05

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.
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
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-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
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.
Inorg-080 ENM	This method is based on RTA T276 and as per NSW DECC Resource Recovery Exemption Guidelines and correspondence. It includes rubber, plastic, bitumen, paper, cloth, paint and wood (Note wood is construction timber only, naturally occuring wood/twigs/roots are excluded). RTA T276 requires at least 6kg of sample for this test.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.

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.
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-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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. 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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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.

Method ID	Methodology Summary
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.
RTA276	RTA 276 - Modified to Environmental Operations (Waste) - 2005 General Exemption under Part 6, Clause 51A.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	94	83
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	94	83
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	100	86
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	96	86
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	80	72
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	96	85
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	97	84
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	93	1	80	74	8	90	83

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			29/11/2019	1	29/11/2019	29/11/2019		29/11/2019	29/11/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	100	96
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	114	110
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	121	113
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	100	96
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	114	110
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	121	113
Surrogate o-Terphenyl	%		Org-003	88	1	88	86	2	102	99

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			29/11/2019	1	29/11/2019	29/11/2019		29/11/2019	29/11/2019
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	82
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	106	100
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	86
Anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	84
Pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	88	82
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	74	128
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	1	<0.05	<0.05	0	112	89
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	88	1	84	82	2	79	84

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			29/11/2019	1	29/11/2019	29/11/2019		29/11/2019	29/11/2019
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	116	109
HCB	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	108	100
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	91
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	95
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	91
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	1	0.1	0.1	0	92	91
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	96	102
Endrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	100
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	95
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	100
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	78	1	81	80	1	81	79

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			29/11/2019	1	29/11/2019	29/11/2019		29/11/2019	29/11/2019
Dichlorvos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	80	100
Dimethoate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	76	78
Fenitrothion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	72	80
Malathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	126	83
Chlorpyriphos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	78	80
Parathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	95
Bromophos-ethyl	mg/kg	0.1	AT-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	70	76
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	78	1	81	80	1	81	79

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date extracted	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			29/11/2019	1	29/11/2019	29/11/2019		29/11/2019	29/11/2019
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	63	67
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	78	1	81	80	1	81	79

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	231726-3
Date prepared	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Date analysed	-			28/11/2019	1	28/11/2019	28/11/2019		28/11/2019	28/11/2019
Arsenic	mg/kg	4	Metals-020	<4	1	10	9	11	107	90
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	103	86
Chromium	mg/kg	1	Metals-020	<1	1	59	60	2	118	95
Copper	mg/kg	1	Metals-020	<1	1	24	30	22	109	105
Lead	mg/kg	1	Metals-020	<1	1	32	38	17	119	96
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	89	88
Nickel	mg/kg	1	Metals-020	<1	1	10	10	0	105	91
Zinc	mg/kg	1	Metals-020	<1	1	46	53	14	108	84

QUALITY CONTROL: Misc Soil - Inorg					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date prepared	-			28/11/2019	[NT]	[NT]	[NT]	[NT]	28/11/2019	[NT]
Date analysed	-			28/11/2019	[NT]	[NT]	[NT]	[NT]	28/11/2019	[NT]
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-9	[NT]
Date prepared	-			29/11/2019	9	29/11/2019	29/11/2019		29/11/2019	[NT]
Date analysed	-			29/11/2019	9	29/11/2019	29/11/2019		29/11/2019	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	9	9.2	9.3	1	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	9	280	310	10	106	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Asbestos: A portion of the supplied 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: Sample 231726-2 was sub-sampled from a jar provided by the client.

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:	86819.01	**Suburb:**	Villawood	**To:**	EnviroLab
Project Name:	Detailed Site Investigation	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Jack Snowden	**Sampler:**	JJH	**Attn:**	Aileen Hie
Emails:	jack.snowden; joel.james-hall@douglaspartners.com.au			**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 - glass, P - plastic)	Analytes: Combo 8	Combo 3	Combo 3a	ENM Suite	AF/FA	Asbestos ID				Notes/preservation
TP9/0-0.3	1	26/11/19	S	G/P	x				x					Composite (C) and Discrete (D)
TP9/0.3-0.5	2	26/11/19	S	G			x							samples supplied for ENM suite
TP10/0-0.3	3	26/11/19	S	G/P	x				x					(eg. SP1-A C and SP1-A D)
TP10/0.3-0.5	4	26/11/19	S	G/P		x			x					bulk plastic composite
SPA-1 (C,D)	5,6	26/11/19	S	G/P				x						samples supplied for FM
SPA-2	7,8	26/11/19	S	G/P				x						
SPA-3	9,10	26/11/19	S	G/P				x						
SPB-1	11,12	26/11/19	S	G/P				x						
SPB-2	13,14	26/11/19	S	G/P				x						
SPB-3	15,16	26/11/19	S	G/P				x						
BD1/20191126	17	26/11/19	S	G		x								
ACM-2	18	26/11/19	S	P						X				

MO

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

Job No: 231726
Date Received: 27.11.19
Time Received: 13:30
Received by: MO
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

ANZECC PQLs req'd for all water analytes ☐

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

Lab Report/Reference No: 231726

Metals to Analyse: 8HM unless specified here:

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

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

Signed: **Received by:** Michael Oyie ELS **Date & Time:** 27.11.19 13:30

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel James-Hall, Jack Snowden

Sample Login Details

Your reference	86819.01, Villawood
Envirolab Reference	231726
Date Sample Received	27/11/2019
Date Instructions Received	27/11/2019
Date Results Expected to be Reported	04/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	17 SOIL, 1 MATERIAL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	16.8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Misc Inorg - Soil	Asbestos ID - soils NEPM	Asbestos ID - soils	Asbestos ID - materials	RTA276 ENM*Foreign Material
TP9-0-0.3	✓	✓	✓	✓	✓	✓	✓	✓		✓			
TP9-0.3-0.5	✓	✓	✓				✓				✓		
TP10-0-0.3	✓	✓	✓	✓	✓	✓	✓	✓		✓			
TP10-0.3-0.5	✓	✓	✓							✓			
SPA-1 C							✓		✓				✓
SPA-1 D	✓	✓	✓										
SPA-2 C							✓		✓				✓
SPA-2 D	✓	✓	✓										
SPA-3 C							✓		✓				✓
SPA-3 D	✓	✓	✓										
SPB-1 C							✓		✓				✓
SPB-1 D	✓	✓	✓										
SPB-2 C							✓		✓				✓
SPB-2 D	✓	✓	✓										
SPB-3 C							✓		✓				✓
SPB-3 D	✓	✓	✓										
BD1/20191126	✓	✓	✓				✓						
ACM-2												✓	

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

Additional Info

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

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www.envirolab.com.au

CERTIFICATE OF ANALYSIS 231726-A

Client Details

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

Sample Details

Your Reference	**86819.01, Villawood**
Number of Samples	17 SOIL, 1 MATERIAL
Date samples received	27/11/2019
Date completed instructions received	03/12/2019

Analysis Details

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

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

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

Report Details

Date results requested by	10/12/2019
Date of Issue	06/12/2019

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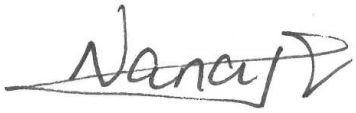
Results Approved By
Loren Bardwell, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Metals in TCLP USEPA1311		
Our Reference		231726-A-17
Your Reference	UNITS	BD1/20191126
Depth		-
Date Sampled		26/11/2019
Type of sample		SOIL
Date extracted	-	04/12/2019
Date analysed	-	04/12/2019
pH of soil for fluid# determ.	pH units	6.8
pH of soil TCLP (after HCl)	pH units	2.0
Extraction fluid used	-	1
pH of final Leachate	pH units	5.0
Chromium in TCLP	mg/L	<0.01

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

QUALITY CONTROL: Metals in TCLP USEPA1311						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			04/12/2019	[NT]	[NT]	[NT]	[NT]	04/12/2019	[NT]
Date analysed	-			04/12/2019	[NT]	[NT]	[NT]	[NT]	04/12/2019	[NT]
Chromium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	[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.

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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Measurement Uncertainty estimates are available for most tests upon request.

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

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

Ken Nguyen

231726-A
Due: 10/12/19
Std TAT

From: Celine Li <Celine.Li@douglaspartners.com.au>
Sent: Tuesday, 3 December 2019 9:16 AM
To: Ken Nguyen
Cc: Jack Snowden
Subject: Results for Registration 231726 86819.01, Villawood -TCLP
Attachments: 231726-[R00].pdf

Hi Ken,

(17)

Could we please schedule TCLP test on the sample BD1/20191126 for chromium? Standard turnaround time please.

Cheers,

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

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12 Ashley St Chatswood NSW 2067
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customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Celine Li, Jack Snowden

Sample Login Details

Your reference	86819.01, Villawood
Envirolab Reference	231726-A
Date Sample Received	27/11/2019
Date Instructions Received	03/12/2019
Date Results Expected to be Reported	10/12/2019

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	17 SOIL, 1 MATERIAL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	16.8
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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12 Ashley St Chatswood NSW 2067
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www.envirolab.com.au

Sample ID	Metals in TCLP USEPA1311	On Hold
TP9-0-0.3		✓
TP9-0.3-0.5		✓
TP10-0-0.3		✓
TP10-0.3-0.5		✓
SPA-1 C		✓
SPA-1 D		✓
SPA-2 C		✓
SPA-2 D		✓
SPA-3 C		✓
SPA-3 D		✓
SPB-1 C		✓
SPB-1 D		✓
SPB-2 C		✓
SPB-2 D		✓
SPB-3 C		✓
SPB-3 D		✓
BD1/20191126	✓	
ACM-2		✓

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

Additional Info

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

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CERTIFICATE OF ANALYSIS 233656

Client Details

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

Sample Details

Your Reference	**86819.01, Kamira Court**
Number of Samples	18 SOIL, 1 MATERIAL
Date samples received	20/12/2019
Date completed instructions received	20/12/2019

Analysis Details

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

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

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

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

Report Details

Date results requested by	06/01/2020
Date of Issue	31/12/2019

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

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Josh Williams, Senior Chemist
Loren Bardwell, Senior Chemist
Lucy Zhu, Senior Asbestos Analyst
Steven Luong, Organics Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		233656-1	233656-2	233656-3	233656-4	233656-5
Your Reference	UNITS	MW1	MW1	MW2	MW2	MW2
Depth		0-0.2	0.3-0.5	0-0.2	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	25/12/2019	25/12/2019	25/12/2019	25/12/2019	25/12/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	110	108	110	106	108

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		233656-7	233656-8	233656-9	233656-10	233656-11
Your Reference	UNITS	MW3	MW3	BH1	BH1	BH1
Depth		0-0.2	0.8-1.0	0.05-0.15	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	25/12/2019	25/12/2019	25/12/2019	25/12/2019	25/12/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	110	106	108	103	107

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		233656-12	233656-13	233656-14	233656-15	233656-16
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.05-0.15	0.3-0.5	0.8-1.0	03-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	25/12/2019	25/12/2019	25/12/2019	25/12/2019	25/12/2019
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<3	<3	<3	<3	<3
Surrogate aaa-Trifluorotoluene	%	108	106	95	107	105

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		233656-17	233656-18	233656-19
Your Reference	UNITS	BD3/20191217	TS	TB
Depth		-	-	-
Date Sampled		17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	25/12/2019	25/12/2019	25/12/2019
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	95%	<0.2
Toluene	mg/kg	<0.5	96%	<0.5
Ethylbenzene	mg/kg	<1	90%	<1
m+p-xylene	mg/kg	<2	89%	<2
o-Xylene	mg/kg	<1	90%	<1
naphthalene	mg/kg	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<3	[NA]	<3
Surrogate aaa-Trifluorotoluene	%	107	96	109

svTRH (C10-C40) in Soil						
Our Reference		233656-1	233656-2	233656-3	233656-4	233656-5
Your Reference	UNITS	MW1	MW1	MW2	MW2	MW2
Depth		0-0.2	0.3-0.5	0-0.2	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	24/12/2019
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	160	<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	140	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	140	<50	<50
Surrogate o-Terphenyl	%	80	87	80	78	89

svTRH (C10-C40) in Soil						
Our Reference		233656-7	233656-8	233656-9	233656-10	233656-11
Your Reference	UNITS	MW3	MW3	BH1	BH1	BH1
Depth		0-0.2	0.8-1.0	0.05-0.15	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
TRH C_{10} - C_{14}	mg/kg	54	<50	58	<50	59
TRH C_{15} - C_{28}	mg/kg	130	<100	140	<100	300
TRH C_{29} - C_{36}	mg/kg	150	<100	250	<100	840
TRH >C_{10} -C_{16}	mg/kg	61	<50	62	<50	64
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	61	<50	62	<50	64
TRH >C_{16} -C_{34}	mg/kg	200	<100	240	<100	740
TRH >C_{34} -C_{40}	mg/kg	110	<100	380	<100	1,100
Total +ve TRH (>C10-C40)	mg/kg	380	<50	680	<50	1,900
Surrogate o-Terphenyl	%	84	78	94	89	91

svTRH (C10-C40) in Soil						
Our Reference		233656-12	233656-13	233656-14	233656-15	233656-16
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.05-0.15	0.3-0.5	0.8-1.0	03-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
TRH C_{10} - C_{14}	mg/kg	<50	51	<50	61	<50
TRH C_{15} - C_{28}	mg/kg	<100	170	<100	140	<100
TRH C_{29} - C_{36}	mg/kg	<100	360	<100	160	<100
TRH >C_{10} -C_{16}	mg/kg	<50	54	<50	64	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	54	<50	64	<50
TRH >C_{16} -C_{34}	mg/kg	<100	360	<100	200	<100
TRH >C_{34} -C_{40}	mg/kg	<100	400	<100	180	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	810	<50	450	<50
Surrogate o-Terphenyl	%	82	84	84	91	77

svTRH (C10-C40) in Soil		
Our Reference		233656-17
Your Reference	UNITS	BD3/20191217
Depth		-
Date Sampled		17/12/2019
Type of sample		SOIL
Date extracted	-	23/12/2019
Date analysed	-	24/12/2019
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	%	79

PAHs in Soil						
Our Reference		233656-1	233656-2	233656-3	233656-4	233656-5
Your Reference	UNITS	MW1	MW1	MW2	MW2	MW2
Depth		0-0.2	0.3-0.5	0-0.2	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	90	97	93	92	95

PAHs in Soil						
Our Reference		233656-7	233656-8	233656-9	233656-10	233656-11
Your Reference	UNITS	MW3	MW3	BH1	BH1	BH1
Depth		0-0.2	0.8-1.0	0.05-0.15	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	0.2	<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	%	92	92	88	90	87

PAHs in Soil						
Our Reference		233656-12	233656-13	233656-14	233656-15	233656-16
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.05-0.15	0.3-0.5	0.8-1.0	03-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	90	88	90	93	89

PAHs in Soil		
Our Reference		233656-17
Your Reference	UNITS	BD3/20191217
Depth		-
Date Sampled		17/12/2019
Type of sample		SOIL
Date extracted	-	23/12/2019
Date analysed	-	23/12/2019
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.1
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo(a)anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2
Benzo(a)pyrene	mg/kg	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1
Total +ve PAH's	mg/kg	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5
Surrogate p-Terphenyl-d14	%	92

Organochlorine Pesticides in soil						
Our Reference		233656-1	233656-3	233656-7	233656-8	233656-9
Your Reference	UNITS	MW1	MW2	MW3	MW3	BH1
Depth		0-0.2	0-0.2	0-0.2	0.8-1.0	0.05-0.15
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	96	95	91	98

Organochlorine Pesticides in soil					
Our Reference		233656-10	233656-12	233656-13	233656-15
Your Reference	UNITS	BH1	BH2	BH2	BH3
Depth		0.3-0.5	0.05-0.15	0.3-0.5	03-0.5
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-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
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	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	<0.1
Surrogate TCMX	%	95	106	94	99

Organophosphorus Pesticides in Soil						
Our Reference		233656-1	233656-3	233656-7	233656-8	233656-9
Your Reference	UNITS	MW1	MW2	MW3	MW3	BH1
Depth		0-0.2	0-0.2	0-0.2	0.8-1.0	0.05-0.15
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	96	95	91	98

Organophosphorus Pesticides in Soil					
Our Reference		233656-10	233656-12	233656-13	233656-15
Your Reference	UNITS	BH1	BH2	BH2	BH3
Depth		0.3-0.5	0.05-0.15	0.3-0.5	03-0.5
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	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
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	95	106	94	99

PCBs in Soil						
Our Reference		233656-1	233656-3	233656-7	233656-8	233656-9
Your Reference	UNITS	MW1	MW2	MW3	MW3	BH1
Depth		0-0.2	0-0.2	0-0.2	0.8-1.0	0.05-0.15
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	96	95	91	98

PCBs in Soil					
Our Reference		233656-10	233656-12	233656-13	233656-15
Your Reference	UNITS	BH1	BH2	BH2	BH3
Depth		0.3-0.5	0.05-0.15	0.3-0.5	03-0.5
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL
Date extracted	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
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 TCMX	%	95	106	94	99

Acid Extractable metals in soil						
Our Reference		233656-1	233656-2	233656-3	233656-4	233656-5
Your Reference	UNITS	MW1	MW1	MW2	MW2	MW2
Depth		0-0.2	0.3-0.5	0-0.2	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Arsenic	mg/kg	5	6	4	7	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	16	14	16	14
Copper	mg/kg	27	19	25	9	14
Lead	mg/kg	11	14	15	12	13
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	5	15	3	4
Zinc	mg/kg	34	27	55	11	21

Acid Extractable metals in soil						
Our Reference		233656-7	233656-8	233656-9	233656-10	233656-11
Your Reference	UNITS	MW3	MW3	BH1	BH1	BH1
Depth		0-0.2	0.8-1.0	0.05-0.15	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Arsenic	mg/kg	8	4	<4	5	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	9	11	55	29	29
Copper	mg/kg	30	25	47	17	76
Lead	mg/kg	14	14	5	11	6
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	13	8	59	18	33
Zinc	mg/kg	62	50	43	22	33

Acid Extractable metals in soil						
Our Reference		233656-12	233656-13	233656-14	233656-15	233656-16
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.05-0.15	0.3-0.5	0.8-1.0	03-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Arsenic	mg/kg	5	5	8	8	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	15	32	11	31	14
Copper	mg/kg	15	28	22	19	16
Lead	mg/kg	11	10	13	23	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	25	4	13	5
Zinc	mg/kg	18	26	23	26	14

Acid Extractable metals in soil			
Our Reference		233656-17	233656-20
Your Reference	UNITS	BD3/20191217	MW1 - [TRIPLICATE]
Depth		-	0-0.2
Date Sampled		17/12/2019	17/12/2019
Type of sample		SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019
Arsenic	mg/kg	6	5
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	14	13
Copper	mg/kg	23	21
Lead	mg/kg	14	13
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	8	5
Zinc	mg/kg	45	29

Misc Soil - Inorg						
Our Reference		233656-1	233656-3	233656-7	233656-8	233656-9
Your Reference	UNITS	MW1	MW2	MW3	MW3	BH1
Depth		0-0.2	0-0.2	0-0.2	0.8-1.0	0.05-0.15
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5	<5

Misc Soil - Inorg					
Our Reference		233656-10	233656-12	233656-13	233656-15
Your Reference	UNITS	BH1	BH2	BH2	BH3
Depth		0.3-0.5	0.05-0.15	0.3-0.5	03-0.5
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Total Phenolics (as Phenol)	mg/kg	<5	<5	<5	<5

Moisture						
Our Reference		233656-1	233656-2	233656-3	233656-4	233656-5
Your Reference	UNITS	MW1	MW1	MW2	MW2	MW2
Depth		0-0.2	0.3-0.5	0-0.2	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
Moisture	%	9.2	14	2.9	13	13

Moisture						
Our Reference		233656-7	233656-8	233656-9	233656-10	233656-11
Your Reference	UNITS	MW3	MW3	BH1	BH1	BH1
Depth		0-0.2	0.8-1.0	0.05-0.15	0.3-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
Moisture	%	6.0	10	3.7	5.3	4.0

Moisture						
Our Reference		233656-12	233656-13	233656-14	233656-15	233656-16
Your Reference	UNITS	BH2	BH2	BH2	BH3	BH3
Depth		0.05-0.15	0.3-0.5	0.8-1.0	03-0.5	0.8-1.0
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	23/12/2019	23/12/2019	23/12/2019	23/12/2019	23/12/2019
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
Moisture	%	12	11	13	12	14

Moisture		
Our Reference		233656-17
Your Reference	UNITS	BD3/20191217
Depth		-
Date Sampled		17/12/2019
Type of sample		SOIL
Date prepared	-	23/12/2019
Date analysed	-	24/12/2019
Moisture	%	9.3

Asbestos ID - soils NEPM						
Our Reference		233656-1	233656-3	233656-7	233656-10	233656-13
Your Reference	UNITS	MW1	MW2	MW3	BH1	BH2
Depth		0-0.2	0-0.2	0-0.2	0.3-0.5	0.3-0.5
Date Sampled		17/12/2019	17/12/2019	17/12/2019	17/12/2019	17/12/2019
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date analysed	-	24/12/2019	24/12/2019	24/12/2019	24/12/2019	24/12/2019
Sample mass tested	g	1,143.19	1,333.28	1,143.6	1,325.41	1,400.76
Sample Description	-	Red clayey soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM		
Our Reference		233656-15
Your Reference	UNITS	BH3
Depth		03-0.5
Date Sampled		17/12/2019
Type of sample		SOIL
Date analysed	-	24/12/2019
Sample mass tested	g	1,540.3
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected
Total Asbestos#1	g/kg	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected
ACM >7mm Estimation*	g	–
FA and AF Estimation*	g	–
FA and AF Estimation*#2	%(w/w)	<0.001

Asbestos ID - materials		
Our Reference		233656-6
Your Reference	UNITS	A1
Depth		-
Date Sampled		17/12/2019
Type of sample		MATERIAL
Date analysed	-	23/12/2019
Mass / Dimension of Sample	-	32x26x5mm
Sample Description	-	Grey fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected
Trace Analysis	-	Not Tested

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.
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
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-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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-MS and/or GC-MS/MS. 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-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-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-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			25/12/2019	1	25/12/2019	25/12/2019		25/12/2019	25/12/2019
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	109	109
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	109	109
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	119	119
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	115	114
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	103	103
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	104	104
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	106	106
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	112	1	110	108	2	109	109

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]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	25/12/2019	25/12/2019		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	15	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	15	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	15	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	15	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	15	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	15	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	15	107	106	1	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	120	95
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	114	79
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	138	94
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	120	95
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	114	79
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	138	94
Surrogate o-Terphenyl	%		Org-003	81	1	80	92	14	93	91

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	24/12/2019	24/12/2019		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	15	61	<50	20	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	15	140	120	15	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	15	160	130	21	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	15	64	52	21	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	15	200	170	16	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	15	180	150	18	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	15	91	85	7	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Naphthalene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	98
Acenaphthylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	102	104
Phenanthrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	98	103
Anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	88	95
Pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	88	95
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	92	97
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	<0.05	1	<0.05	<0.05	0	100	105
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	94	1	90	102	12	90	102

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012/017	[NT]	15	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012/017	[NT]	15	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	[NT]	15	93	92	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
alpha-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	100	102
HCB	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	104	104
gamma-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	90	98
delta-BHC	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	100	106
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	94	102
gamma-Chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	98	104
Dieldrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	88	92
Endrin	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	88	96
Endosulfan II	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	80	86
Endrin Aldehyde	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	70	84
Methoxychlor	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	96	1	93	103	10	97	101

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
HCB	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	[NT]	15	99	93	6	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Dichlorvos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	78	88
Dimethoate	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	90
Fenitrothion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	86
Malathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	61	70
Chlorpyriphos	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	86	88
Parathion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	100	112
Bromophos-ethyl	mg/kg	0.1	AT-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	72	82
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	96	1	93	103	10	97	101

QUALITY CONTROL: Organophosphorus Pesticides in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	AT-008	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-012/017	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	[NT]	15	99	93	6	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date extracted	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	70	74
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	96	1	93	103	10	97	101

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-006	[NT]	15	99	93	6	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date prepared	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Arsenic	mg/kg	4	Metals-020	<4	1	5	5	0	98	95
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	<0.4	<0.4	0	91	81
Chromium	mg/kg	1	Metals-020	<1	1	11	12	9	101	92
Copper	mg/kg	1	Metals-020	<1	1	27	14	63	100	116
Lead	mg/kg	1	Metals-020	<1	1	11	11	0	105	101
Mercury	mg/kg	0.1	Metals-021	<0.1	1	<0.1	<0.1	0	102	105
Nickel	mg/kg	1	Metals-020	<1	1	5	3	50	94	90
Zinc	mg/kg	1	Metals-020	<1	1	34	23	39	104	96

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Date analysed	-			[NT]	15	23/12/2019	23/12/2019		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	15	8	7	13	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	15	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	15	31	25	21	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	15	19	19	0	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	15	23	19	19	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	15	13	11	17	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	15	26	25	4	[NT]	[NT]

QUALITY CONTROL: Misc Soil - Inorg						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	233656-3
Date prepared	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Date analysed	-			23/12/2019	1	23/12/2019	23/12/2019		23/12/2019	23/12/2019
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	1	<5	<5	0	101	112

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

Asbestos-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.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 233656-1 for Cu. Therefore a triplicate result has been issued as laboratory sample number 233656-20.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86819.01	**Suburb:**	Kamira Court	**To:**	EnviroLab
Project Name:	Kamira Court DSI	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Jack Snowden	**Sampler:**	JJH	**Attn:**	Aileen Hie
Emails:	jack.snowden; joel.james-hall@douglaspartners.com.au			**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 - glass, P - plastic)	Analytes: Combo 8	Combo 3	FA/AF	Asbestos ID	BTEX					Notes/preservation
MW1/0-0.2	1	17.12.19	S	G	x		x							
MW1/0.3-0.5	2	17.12.19	S	G		x								
MW2/0-0.2	3	17.12.19	S	G	x		x							
MW2/0.3-0.5	4	17.12.19	S	G		x								
MW2/0.8-1.0	5	17.12.19	S	G		x								
MW2- A1	6	17.12.19	S	G				x						
MW3/0-0.2	7	18.12.19	S	G	x		x							
MW3/0.8-1.0	8	18.12.19	S	G	x									
BH1/0.05-0.15	9	17.12.19	S	G	x									
BH1/0.3-0.5	10	17.12.19	S	G	x		x							
BH1/0.8-1.0	11	17.12.19	S	G		x								
BH2/0.05-0.15	12	17.12.19	S	G	x									
BH2/0.3-0.5	13	17.12.19	S	G	x		x							
BH2/0.8-1.0	14	17.12.19	S	G		x								
BH3/0.3-0.5	15	17.12.19	S	G	x		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: 233656

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

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

Signed: **Received by:** ELS Syd. S.Bolton **Date & Time:** 20/12/19 12:20

ENVIROLAB

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

Job No: 233656
Date Received: 20/12/19
Time Received: 1220
Received by: SB
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/~~None~~

Douglas Partners
Geotechnics | Environment | Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86819.01	**Suburb:**	Kamira Court	**To:**	EnviroLab
Project Name:	Kamira Court DSI	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Jack Snowden	**Sampler:**	JJH	**Attn:**	Aileen Hie
Emails:	jack.snowden; joel.james-hall@douglaspartners.com.au			**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 - glass P - plastic)	Analytes: Combo 8	Combo 3	FA/AF	Asbestos ID	BTEX					Notes/preservation
BH3/0.8-1.0	16	17.12.19	S	G		x								
BD20191217	17	17.12.19	S	G		x								
TS	18	17.12.19	S	G					x					
TB	19	17.12.19	S	G					x					
PQL (S) mg/kg													**ANZECC PQLs req'd for all water analytes** ☐	

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

Metals to Analyse: 8HM unless specified here:

Lab Report/Reference No: 233656

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:** ECS Syd. S.Bolton **Date & Time:** 20/12/19 12:20.

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Jack Snowden

Sample Login Details

Your reference	86819.01, Kamira Court
Envirolab Reference	233656
Date Sample Received	20/12/2019
Date Instructions Received	20/12/2019
Date Results Expected to be Reported	06/01/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	18 SOIL, 1 MATERIAL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	15.4
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticides in soil	Organophosphorus Pesticides in Soil	PCBsin Soil	Acid Extractable metalsin soil	Misc Soil - Inorg	Asbestos ID - soils NEPM	Asbestos ID - materials
MW1-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW1-0.3-0.5	✓	✓	✓				✓			
MW2-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW2-0.3-0.5	✓	✓	✓				✓			
MW2-0.8-1.0	✓	✓	✓				✓			
A1										✓
MW3-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW3-0.8-1.0	✓	✓	✓	✓	✓	✓	✓	✓		
BH1-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓		
BH1-0.3-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH1-0.8-1.0	✓	✓	✓				✓			
BH2-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓		
BH2-0.3-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH2-0.8-1.0	✓	✓	✓				✓			
BH3-03-0.5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BH3-0.8-1.0	✓	✓	✓				✓			
BD3/20191217	✓	✓	✓				✓			
TS	✓									
TB	✓									

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

Additional Info

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

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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 235240

Client Details

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

Sample Details

Your Reference	**86819.01, Kamira Court DSI**
Number of Samples	5 Water
Date samples received	24/01/2020
Date completed instructions received	24/01/2020

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	03/02/2020
Date of Issue	03/02/2020

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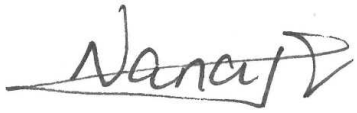
Results Approved By
Diego Bigolin, Team Leader, Inorganics
Jaimie Loa-Kum-Cheung, Metals Supervisor
Josh Williams, Senior Chemist
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

VOCs in water						
Our Reference	UNITS	235240-1	235240-2	235240-3	235240-4	235240-5
Your Reference		MW1	MW2	MW3	BD1/20200124	R01
Date Sampled		24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	28/01/2020	28/01/2020	28/01/2020	28/01/2020	28/01/2020
Date analysed	-	30/01/2020	30/01/2020	30/01/2020	30/01/2020	30/01/2020
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	<1	<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	2
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

VOCs in water						
Our Reference		235240-1	235240-2	235240-3	235240-4	235240-5
Your Reference	UNITS	MW1	MW2	MW3	BD1/20200124	R01
Date Sampled		24/01/2020	24/01/2020	24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water	Water	Water
Bromoform	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<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	<1	<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	<1	<1	<1	<1
Tert-butyl benzene	µg/L	<1	<1	<1	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1	<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	%	108	108	106	106	107
Surrogate toluene-d8	%	100	102	99	101	101
Surrogate 4-BFB	%	113	113	115	115	113

vTRH(C6-C10)/BTEXN in Water				
Our Reference	UNITS	235240-1	235240-2	235240-3
Your Reference		MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	28/01/2020	28/01/2020	28/01/2020
Date analysed	-	30/01/2020	30/01/2020	30/01/2020
TRH C_6 - C_9	µg/L	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	108	108	106
Surrogate toluene-d8	%	100	102	99
Surrogate 4-BFB	%	113	113	115

svTRH (C10-C40) in Water				
Our Reference		235240-1	235240-2	235240-3
Your Reference	UNITS	MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	30/01/2020	30/01/2020	30/01/2020
Date analysed	-	31/01/2020	31/01/2020	31/01/2020
TRH C_{10} - C_{14}	µg/L	<50	440	1,300
TRH C_{15} - C_{28}	µg/L	<100	1,000	2,700
TRH C_{29} - C_{36}	µg/L	<100	180	540
TRH >C_{10} - C_{16}	µg/L	<50	600	1,700
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	600	1,700
TRH >C_{16} - C_{34}	µg/L	<100	970	2,500
TRH >C_{34} - C_{40}	µg/L	<100	<100	300
Surrogate o-Terphenyl	%	60	#	#

PAHs in Water				
Our Reference	UNITS	235240-1	235240-2	235240-3
Your Reference		MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	30/01/2020	30/01/2020	30/01/2020
Date analysed	-	31/01/2020	31/01/2020	31/01/2020
Naphthalene	µg/L	<1	<1	2
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	2
Fluorene	µg/L	<1	1	4
Phenanthrene	µg/L	<1	3	9
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	4
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	2
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	4.7	22
Surrogate p-Terphenyl-d14	%	97	71	77

OCPs in Water - Low Level				
Our Reference	UNITS	235240-1	235240-2	235240-3
Your Reference		MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	30/01/2020	30/01/2020	30/01/2020
Date analysed	-	31/01/2020	31/01/2020	31/01/2020
alpha-BHC	µg/L	<0.01	<0.01	<0.01
HCB	µg/L	<0.01	<0.01	<0.01
beta-BHC	µg/L	<0.01	<0.01	<0.01
gamma-BHC	µg/L	<0.01	<0.01	<0.01
Heptachlor	µg/L	<0.01	<0.01	<0.01
delta-BHC	µg/L	<0.01	<0.01	<0.01
Aldrin	µg/L	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01	<0.01
Endosulfan I	µg/L	<0.01	<0.01	<0.01
pp-DDE	µg/L	<0.01	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01	<0.01
Endosulfan II	µg/L	<0.01	<0.01	<0.01
pp-DDD	µg/L	<0.01	<0.01	<0.01
Endrin Aldehyde	µg/L	<0.01	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.01	<0.01	<0.01
Methoxychlor	µg/L	<0.01	<0.01	<0.01
Surrogate TCMX	%	65	65	61

OP Pesticides in water LL				
Our Reference		235240-1	235240-2	235240-3
Your Reference	UNITS	MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	30/01/2020	30/01/2020	30/01/2020
Date analysed	-	31/01/2020	31/01/2020	31/01/2020
Diazinon	µg/L	<0.01	<0.01	<0.01
Dimethoate	µg/L	<0.01	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.01	<0.01	<0.01
Ronnel	µg/L	<0.01	<0.01	<0.01
Chlorpyriphos	µg/L	<0.009	<0.009	<0.009
Fenitrothion	µg/L	<0.01	<0.01	<0.01
Bromophos ethyl	µg/L	<0.01	<0.01	<0.01
Ethion	µg/L	<0.01	<0.01	<0.01
Surrogate TCMX	%	65	65	61

PCBs in Water - Low Level				
Our Reference		235240-1	235240-2	235240-3
Your Reference	UNITS	MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	30/01/2020	30/01/2020	30/01/2020
Date analysed	-	31/01/2020	31/01/2020	31/01/2020
Aroclor 1016	µg/L	<0.1	<0.1	<0.1
Aroclor 1221	µg/L	<0.1	<0.1	<0.1
Aroclor 1232	µg/L	<0.1	<0.1	<0.1
Aroclor 1242	µg/L	<0.1	<0.1	<0.1
Aroclor 1248	µg/L	<0.1	<0.1	<0.1
Aroclor 1254	µg/L	<0.1	<0.1	<0.1
Aroclor 1260	µg/L	<0.1	<0.1	<0.1
Surrogate TCMX	%	65	65	61

Total Phenolics in Water				
Our Reference		235240-1	235240-2	235240-3
Your Reference	UNITS	MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date extracted	-	29/01/2020	29/01/2020	29/01/2020
Date analysed	-	29/01/2020	29/01/2020	29/01/2020
Total Phenolics (as Phenol)	mg/L	<0.05	<0.05	<0.05

HM in water - dissolved					
Our Reference		235240-1	235240-2	235240-3	235240-4
Your Reference	UNITS	MW1	MW2	MW3	BD1/20200124
Date Sampled		24/01/2020	24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water	Water
Date prepared	-	29/01/2020	29/01/2020	29/01/2020	29/01/2020
Date analysed	-	29/01/2020	29/01/2020	29/01/2020	29/01/2020
Arsenic-Dissolved	µg/L	<1	3	4	<1
Cadmium-Dissolved	µg/L	0.2	0.6	<0.1	0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1
Copper-Dissolved	µg/L	1	2	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	16	29	<1	15
Zinc-Dissolved	µg/L	23	67	3	15

Miscellaneous Inorganics				
Our Reference	UNITS	235240-1	235240-2	235240-3
Your Reference		MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date prepared	-	24/01/2020	24/01/2020	24/01/2020
Date analysed	-	24/01/2020	24/01/2020	24/01/2020
pH	pH Units	7.2	7.6	8.2

Cations in water Dissolved				
Our Reference		235240-1	235240-2	235240-3
Your Reference	UNITS	MW1	MW2	MW3
Date Sampled		24/01/2020	24/01/2020	24/01/2020
Type of sample		Water	Water	Water
Date digested	-	29/01/2020	29/01/2020	29/01/2020
Date analysed	-	29/01/2020	29/01/2020	29/01/2020
Calcium - Dissolved	mg/L	95	83	16
Magnesium - Dissolved	mg/L	880	740	33
Hardness	mgCaCO 3 /L	3,900	3,200	180

Method ID	Methodology Summary
AT-008	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
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-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.
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-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
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-W2	[NT]
Date extracted	-			28/01/2020	5	28/01/2020	30/01/2020		28/01/2020	[NT]
Date analysed	-			30/01/2020	5	30/01/2020	31/01/2020		30/01/2020	[NT]
Dichlorodifluoromethane	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
Chloromethane	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
Bromomethane	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
Chloroethane	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-013	<10	5	<10	<10	0	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	123	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Chloroform	µg/L	1	Org-013	<1	5	2	3	40	123	[NT]
2,2-dichloropropane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	121	[NT]
1,1,1-trichloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	122	[NT]
1,1-dichloropropene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Cyclohexane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Benzene	µg/L	1	Org-013	<1	5	<1	1	0	[NT]	[NT]
Dibromomethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Trichloroethene	µg/L	1	Org-013	<1	5	<1	<1	0	119	[NT]
Bromodichloromethane	µg/L	1	Org-013	<1	5	2	4	67	114	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-013	<1	5	1	2	67	107	[NT]
1,2-dibromoethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-013	<1	5	<1	<1	0	120	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Bromoform	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-013	<2	5	<2	<2	0	[NT]	[NT]
Styrene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]

QUALITY CONTROL: VOCs in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
o-xylene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Bromobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	5	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-013	104	5	107	104	3	101	[NT]
Surrogate toluene-d8	%		Org-013	100	5	101	101	0	101	[NT]
Surrogate 4-BFB	%		Org-013	112	5	113	112	1	101	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			28/01/2020	[NT]	[NT]	[NT]	[NT]	28/01/2020	[NT]
Date analysed	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	123	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	123	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	123	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	127	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	121	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	121	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	104	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate toluene-d8	%		Org-016	100	[NT]	[NT]	[NT]	[NT]	101	[NT]
Surrogate 4-BFB	%		Org-016	112	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
Date analysed	-			31/01/2020	[NT]	[NT]	[NT]	[NT]	31/01/2020	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	83	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	120	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	83	[NT]
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	[NT]	[NT]	85	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
Date analysed	-			31/01/2020	[NT]	[NT]	[NT]	[NT]	31/01/2020	[NT]
Naphthalene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Acenaphthylene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	74	[NT]
Phenanthrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	79	[NT]
Anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	66	[NT]
Pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	73	[NT]
Benzo(a)anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012/017	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	68	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012/017	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	97	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: OCPs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
Date analysed	-			31/01/2020	[NT]	[NT]	[NT]	[NT]	31/01/2020	[NT]
alpha-BHC	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	112	[NT]
HCB	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	108	[NT]
gamma-BHC	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	108	[NT]
delta-BHC	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	106	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	116	[NT]
gamma-Chlordane	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	98	[NT]
Dieldrin	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	126	[NT]
Endrin	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	106	[NT]
Endosulfan II	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	106	[NT]
Endrin Aldehyde	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.006	AT-008	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
Methoxychlor	µg/L	0.01	Org-012/017	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	80	[NT]	[NT]	[NT]	[NT]	74	[NT]

QUALITY CONTROL: OP Pesticides in water LL						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
Date analysed	-			31/01/2020	[NT]	[NT]	[NT]	[NT]	31/01/2020	[NT]
Diazinon	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dimethoate	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Chlorpyriphos	µg/L	0.009	Org-008	<0.009	[NT]	[NT]	[NT]	[NT]	102	[NT]
Fenitrothion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	114	[NT]
Bromophos ethyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NT]	[NT]	96	[NT]
Surrogate TCMX	%		Org-008	80	[NT]	[NT]	[NT]	[NT]	74	[NT]

QUALITY CONTROL: PCBs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			30/01/2020	[NT]	[NT]	[NT]	[NT]	30/01/2020	[NT]
Date analysed	-			31/01/2020	[NT]	[NT]	[NT]	[NT]	31/01/2020	[NT]
Aroclor 1016	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Aroclor 1260	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-006	80	[NT]	[NT]	[NT]	[NT]	74	[NT]

QUALITY CONTROL: Total Phenolics in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Date analysed	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Total Phenolics (as Phenol)	mg/L	0.05	Inorg-031	<0.05	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Date analysed	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	108	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/01/2020	[NT]	[NT]	[NT]	[NT]	24/01/2020	[NT]
Date analysed	-			24/01/2020	[NT]	[NT]	[NT]	[NT]	24/01/2020	[NT]
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Date analysed	-			29/01/2020	[NT]	[NT]	[NT]	[NT]	29/01/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	104	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

TRH Water(C10-C40) NEPM - Percent recovery for the surrogate is not possible to report due to interference from analytes (other than those being tested) in samples 235240 2, 3.

Douglas Partners
Geotechnics / Environment / Groundwater

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	86819.01	**Suburb:**	Kamira Court	**To:**	EnviroLab
Project Name:	Kamira Court DSI	**Order Number**			12 Ashley Street, Chatswood 2067
Project Manager:	Jack Snowden	**Sampler:**	JJH	**Attn:**	Aileen Hie
Emails:	jack.snowden; joel.james-hall@douglaspartners.com.au			**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 - glass, P - plastic)	Analytes: Combo 8L	VOCs	8 HM	pH	Hardness					Notes/preservation
MW1	1	24/01/20	W	G/P	x	x		x	x					low level OPP/OCP/PCBs
MW2	2	24/01/20	W	G/P	x	x		x	x					low level OPP/OCP/PCBs
MW3	3	24/01/20	W	G/P	x	x		x	x					low level OPP/OCP/PCBs
BD1/20200124	4	24/01/20	W	G/P		x	x							
R01	5	24/01/20	W	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: 235240
Date Received: 24/01/20
Time Received: 1652
Received by: SR
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: 235240

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

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

Signed: | **Received by:** E Bolton EDS | **Date & Time:** 24/01/20 1652

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

SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel James-Hall, Jack Snowden

Sample Login Details

Your reference	86819.01, Kamira Court DSI
Envirolab Reference	235240
Date Sample Received	24/01/2020
Date Instructions Received	24/01/2020
Date Results Expected to be Reported	03/02/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	5 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	13.0
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHsin Water	OCPs in Water - Low Level	OP Pesticides in water LL	PCBs in Water - Low Level	Total Phenolicsin Water	HM in water - dissolved	pH	Cations in water Dissolved
MW1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BD1/20200124	✓								✓		
R01	✓										

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

Additional Info

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

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CERTIFICATE OF ANALYSIS 235240-A

Client Details

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

Sample Details

Your Reference	**86819.01, Kamira Court DSI**
Number of Samples	5 Water
Date samples received	24/01/2020
Date completed instructions received	05/02/2020

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

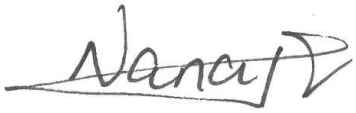
Date results requested by	10/02/2020
Date of Issue	10/02/2020

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Results Approved By
Josh Williams, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

sTPH in Water (C10-C40) NEPM Silica gel			
Our Reference		235240-A-2	235240-A-3
Your Reference	UNITS	MW2	MW3
Date Sampled		24/01/2020	24/01/2020
Type of sample		Water	Water
Date extracted	-	10/02/2020	10/02/2020
Date analysed	-	10/02/2020	10/02/2020
TPH C_{10} - C_{14}	µg/L	300	850
TPH C_{15} - C_{28}	µg/L	750	1,900
TPH C_{29} - C_{36}	µg/L	110	350
TPH >C_{10} - C_{16}	µg/L	420	1,200
TPH >C_{16} - C_{34}	µg/L	660	1,700
TPH >C_{34} - C_{40}	µg/L	<100	190
Surrogate o-Terphenyl	%	71	83

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.

QUALITY CONTROL: sTPH in Water (C10-C40) NEPM Silica gel						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			10/02/2020	[NT]	[NT]	[NT]	[NT]	10/02/2020	[NT]
Date analysed	-			10/02/2020	[NT]	[NT]	[NT]	[NT]	10/02/2020	[NT]
TPH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TPH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TPH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	103	[NT]
TPH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	88	[NT]
TPH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	107	[NT]
TPH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	103	[NT]
Surrogate o-Terphenyl	%		Org-003	108	[NT]	[NT]	[NT]	[NT]	101	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
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NEPM	National Environmental Protection Measure
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Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Andrew (Fitzy) Fitzsimons

From: Ken Nguyen
Sent: Monday, 10 February 2020 10:56 AM
To: Steven Luong; Andrew (Fitzy) Fitzsimons
Subject: FW: Results for Registration 235240 86819.01, Kamira Court DSI

Follow Up Flag: Follow up
Flag Status: Flagged

Ref: 235240-A
TAT: 1 day
Due: 10/2/20

Kind Regards,

Ken Nguyen | Customer Service / 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: Joel James-Hall <joel.james-hall@douglaspartners.com.au>
Sent: Wednesday, 5 February 2020 2:01 PM
To: Ken Nguyen <KNguyen@envirolab.com.au>
Cc: Jack Snowden <Jack.Snowden@douglaspartners.com.au>
Subject: RE: Results for Registration 235240 86819.01, Kamira Court DSI

Hi Ken,

Could we please schedule silica gel cleanup (TRH) for the following samples

- MW2 (ELS ref 235240-2)
- MW3 (ELS ref 235240-3)

24h TAT if possible.

In the meantime would it be possible to be provided the TRH chromatographs for these samples?

Cheers

Joel James-Hall | Environmental Engineer
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 9809 0666 | E: joel.james-hall@douglaspartners.com.au

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SAMPLE RECEIPT ADVICE

Client Details

Client	Douglas Partners Pty Ltd
Attention	Joel James-Hall

Sample Login Details

Your reference	86819.01, Kamira Court DSI
Envirolab Reference	235240-A
Date Sample Received	24/01/2020
Date Instructions Received	05/02/2020
Date Results Expected to be Reported	10/02/2020

Sample Condition

Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	5 Water
Turnaround Time Requested	3 days
Temperature on Receipt (°C)	13.0
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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12 Ashley St Chatswood NSW 2067
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www.envirolab.com.au

Sample ID	sTPH in Water (C10-C40) NEPM Silica gel	On Hold
MW1		✓
MW2	✓	
MW3	✓	
BD1/20200124		✓
R01		✓

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

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
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TAT for Micro is dependent on incubation. This varies from 3 to 6 days.