ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

JDH ARCHITECTS

ON

ADDITIONAL ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED SCHOOL DEVELOPMENT

AT

ST IVES HIGH SCHOOL, YARRABUNG ROAD, ST IVES, NSW

15 NOVEMBER 2018 **REF: E31754KTrpt2**

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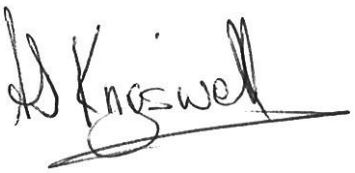

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ABBREVIATIONS

Asbestos Fines/Fibrous Asbestos	**AF/FA**
Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Benzo(a)pyrene Toxicity Equivalent Factor	**BaP TEQ**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Development Application	**DA**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Investigation Level	**EIL**
Environmental Investigation Services	**EIS**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environment Protection Authority	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Fibre Cement Fragment(s)	**FCF**
General Approval of Immobilisation	**GAI**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Potential ASS	**PASS**
Polychlorinated Biphenyls	**PCBs**

ABBREVIATIONS

Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Site Specific Assessment	**SSA**
Source, Pathway, Receptor	**SPR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Standard Sampling Procedure	**SSP**
Standing Water Level	**SWL**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
World Health Organisation	**WHO**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Millivolts	**mV**
Millilitres	**ml or mL**
Milliequivalents	**meq**
micro Siemens per Centimetre	**µS/cm**
Micrograms per Litre	**µg/L**
Milligrams per Kilogram	**mg/kg**
Milligrams per Litre	**mg/L**
Parts Per Million	**ppm**
Percentage	**%**

1 INTRODUCTION

JDH Architects ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake an additional Environmental Site Assessment (ESA) for the proposed school development at St Ives High School, Yarrabung Road, St Ives ('the site'). The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

The assessment was limited to the proposed development area only which occupies part of the south-western section of the property, as shown on Figure 2. For the purpose of this report, the assessment area has been referred to as 'the site', whilst the whole property has been referred to as 'the school'.

This report has been prepared to support the lodgement of a Development Application (DA) with Ku-Ring-Gai Municipal Council.

A geotechnical investigation was undertaken previously to this assessment by JK Geotechnics[2]. The results of the investigation are presented in a separate report (Ref. 31754BCrpt, dated 4 September 2018[3]). This report should be read in conjunction with the JK report.

EIS have previously undertaken a Preliminary Stage 1/2 ESA at the site. This also included a Preliminary Salinity Assessment. A summary of this information has been included in Section 2.

1.1 Proposed Development Details

We understand that the proposed alterations and additions at the school, will include construction of new two to four court indoor sports centre, new synthetic playing field and upgrade of teaching spaces. The latest conceptual development plan (ref; CD301_Option 3- Site Plan, dated 07/08/2018) indicates the development area will be located in the western portion of the existing sport oval and hard court area. The development works are only in the concept stages and the exact location of the proposed facilities and structures, development levels, and proposed earthworks were unavailable at the time of the investigation and preparation of this report.

1.2 Aims and Objectives

The primary aims of the assessment were to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make an assessment of the soil and groundwater contamination conditions. The assessment objectives were to:

- Further investigate the site based on the findings of the EIS Stage 1/2 ESA;
- Assess the soil and groundwater contamination conditions via implementation of a sampling and analysis program;

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

[2] Geotechnical consulting division of J&K

[3] Referred to as JK Geotechnics (2018)

- Target sampling in the footprint of the former buildings to close out the unknowns associated with this potential source of contamination;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a waste classification for off-site disposal of soil;
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint); and
- Assess whether further intrusive investigation and/or remediation is required.

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP48085KT) of 17 September 2018 and written acceptance from the client of 8 October 2018. The scope of work included the following:

- Review of site information, including background and site history information from a Lotsearch Pty Ltd *Environmental Risk and Planning Report* and other sources;
- Preparation of a CSM;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted Site Assessment Criteria (SAC);
- Data Quality Assessment; and
- Preparation of a report including a Tier 1 risk assessment.

The scope of work was undertaken with reference to the National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)[4], other guidelines made under or with regards to the Contaminated Land Management Act (1997)[5] and State Environmental Planning Policy No.55 – Remediation of Land (1998)[6]. A list of reference documents/guidelines is included in the appendices.

[4] National Environment Protection Council (NEPC), (2013). *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013).* (referred to as NEPM 2013)

[5] Contaminated Land Management Act 1997 (NSW) (referred to as CLM Act 1997)

[6] *State Environmental Planning Policy No. 55 – Remediation of Land 1998* (NSW) (referred to as SEPP55)

2 SITE INFORMATION

2.1 Background

2.1.1 Preliminary Stage 1/2 Environmental Site Assessment

A Preliminary Stage 1/2 ESA was undertaken at the site in September 2018 (Ref: E 31754KTrpt). The contamination assessment included a desktop site history assessment and fill/soil sampling from a total of five boreholes concurrently with the geotechnical investigation. The historical assessment identified various potential sources of contamination/Areas of Environmental Concern (AEC), including fill, historical agricultural land use and hazardous building materials (i.e. from former demolition). The site inspection did not identify any obvious sources of potential contamination.

Elevated concentrations of contaminants above the SAC were not identified during the investigation. On this basis, EIS was of the opinion that potential risks associated with contamination (i.e. the Contaminants of Potential Concern (CoPC)) within the site was moderate. Due to the former use of the site as an orchard and the limited number of sampling points, the likelihood of unidentified contamination being present within the investigation area was possible.

Further investigation and/or remediation was considered to be required due to the historic use of the site as an orchard and demolition of former buildings.

EIS had recommended the following:

- An additional environmental site assessment to meet the minimum recommended sampling density for a site with an area of approximately 7,500m^2; and
- Targeted sampling in the footprint of the former buildings to close out the unknowns associated with this potential source of contamination and the CoPC.

2.1.2 Preliminary Salinity Assessment

A Preliminary Salinity Assessment was undertaken at the site in September 2018 (Ref: E 31754KTrpt-SAL). Based on the findings, significantly saline and/or aggressive soil conditions are not expected to be encountered during the development works (as described in Section 1.1) within 2m of the surface. EIS recommended that the structural engineer review the exposure classification and salinity results within the report and factor these into the design accordingly. Reference should also be made to local council policy which applies to the site and all areas in the Ku-Ring-Gai Municipal Council local government area for building in saline areas.

2.1.3 JK Geotechnical Investigation

The geotechnical investigation undertaken at the site in September 2018 indicated that the site was underlain by fill at depths of between 0.4-3.0m below ground level (bgl). The fill was shallower in the northern section and deeper in the southern section. The fill was underlain by residual silty clay and weathered siltstone and sandstone bedrock. Groundwater seepage was encountered in one of the boreholes at 4.5m bgl.

2.2 Site Identification

Table 2-1: Site Identification

Site Address:	St Ives High School, Yarrabung Road, St Ives, NSW
Lot & Deposited Plan:	Part of Lot 4 in DP1209, Lot 1 in DP376563, Lot 1 in DP122432 and Lot 1 in DP122431
Current Land Use:	High School
Proposed Land Use:	Unchanged
Local Government Authority:	Ku-Ring-Gai Municipal Council
Current Zoning:	SP2 – Infrastructure: Educational Establishment
Site Area (m^2):	~7,500
RL (AHD in m) (approx.):	135 - 149
Geographical Location (decimal degrees) (approx.):	Latitude: -33.740764 Longitude: 151.165601
Site Location Plan:	Figure 1
Sample Location Plan:	Figure 2
Site Location & Regional Setting:	The site is located in a predominantly residential area of St Ives. The site is bounded by Horace Street to the west, Hunter Avenue to the south and Yarrabung Road to the east. The site is located approximately 200m to the north-west of a tributary of Rocky Creek.
Topography	The site is located within gently undulating regional topography with the investigation area itself located on the south-facing side of a hill that slopes down at approximately 10°. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development.
Geology & Hydrogeology:	The majority of the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite. The south-east corner of the site is underlain by Triassic aged deposits of medium to coarse-grained quartz sandstone with very minor shale laminate lenses.

	Hydrogeological information reviewed in the preliminary Stage 1/2 contamination assessment indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. A 180m deep groundwater well utilised for domestic, stock purposes was located approximately 870m to the north-west. Clay, sandstone and shale were recorded in the well with a standing water level (SWL) recorded at 67.0m. Subsurface conditions at the site are likely to consist of relatively low permeability (residual) soils overlying shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. Use of groundwater is not proposed as part of the development. Considering the local topography and surrounding land features, EIS would generally expect groundwater to flow towards the south-east.
Acid Sulfate Soil:	Information reviewed for the preliminary Stage 1/2 ESA indicated that the site is located within a Class 5 area. Works in Class 5 areas that could pose an environmental risk in terms of ASS include works within 500m of adjacent Class 1,2,3,4 land which are likely to lower the water table below 1m AHD on the adjacent land.
Receiving Water Bodies:	Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is a tributary of Rocky Creek located approximately 200m to the south-east of the site. This is down-gradient from site and may be a potential receptor.
Surrounding Land Use:	The site was bound to the north by St Ives Primary School, and residential properties on all other sides. EIS did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

2.3 Site Inspection

A walkover inspection of the site was undertaken by EIS on 17 and 18 October 2018. The inspection was limited to accessible areas of the site and immediate surrounds. The site generally appeared similar to the previous site inspection undertaken during the preliminary Stage 1/2 ESA on 16 August 2018.

The site was located within the grounds of St Ives High School and comprised various buildings, including permanent and demountable buildings, grassed and paved recreational areas and car parks.

No buildings or structures were present at the site. The northern half of the site was paved and utilised as a basketball court. Synthetic turf covered the paved areas on the east, north and west of the basketball court. The southern site area was occupied by an undercover basketball court and shaded play areas.

Visible or olfactory indicators of contamination were not observed. Drums/chemicals or other waste was not observed. It is assumed that there is a maintenance shed/store within the wider site, although this was not inspected. Based on EIS' experience with other schools projects, this area would be unlikely to include the storage of significant quantities of dangerous goods such as paint, paint thinners and/or motor mower fuel. There were no obvious areas of exposed fill observed. However, imported material/fill was considered likely to be present in garden beds and as a result of general levelling works across the site, including the terraced sports fields in the southern half of the site.

Various trees and shrubs were located throughout the site. The vegetation appeared to be in reasonable condition based on a cursory inspection, with no obvious or extensive dieback observed. Grass coverage was generally good, with the exception of some areas beneath large trees and isolated areas of the playground.

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site. Garigal National Park was located approximately 200m downgradient from the site to the south-east.

2.4 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the assessment in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration.

The DBYD plans indicated that stormwater mains extend through the western section of the site in a north-south direction. The stormwater mains are potentially at shallow depths and also extend through the neighbouring Hunter Avenue and properties to the south-east. Considering the geological conditions (discussed in Table 2-1), there is a potential for the stormwater trenches to act as a preferential pathway for contamination migration (i.e. through relatively permeable backfill).

2.5 Local Meteorology

Key meteorological data for Sydney Observatory weather station available on the Bureau of Meteorology (BOM)[7] website has been reviewed and EIS note the following:

- The highest mean rainfall occurs in June, with a total of 133.2mm;
- The lowest mean rainfall occurs in September, with a total of 67.8mm; and

[7] http://www.bom.gov.au/climate/averages/tables/cw_066062.shtml visited on 14 November 2018.

- In the lead up to the EIS site works, an average of approximately 9.0mm of rainfall had occurred in the 1-2 weeks prior to the works.

3 SITE HISTORY SUMMARY

The site was potentially used for agricultural (orchards) purposes prior to 1943. Historical aerial photographs indicated the site was covered with rows of trees. Background graphics on the historical maps contained within the Lotsearch report (attached in the Preliminary Stage 1/2 ESA report) identified the site to be utilised for orchards. Aerial photographs suggested that the site was part of the orchard and may have had a residential structure in the south-eastern corner.

Potential filling of the site may have occurred for construction of the high school (developed progressively from 1965) between 1961 and 1965. The former site structures were no longer visible on the site in the aerial photographs from 1965 onwards.

4 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

A review of the CSM in relation to source, pathway and receptor (SPR) linkages has been undertaken as part of the Tier 1 risk assessment process, as outlined in Section 9.

4.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 4-1: Potential (and/or known) Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material – The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Historical agricultural use (Orchards) – The site appears to have been used for grazing and market garden purposes. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/demolition of various structures.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos EIS note that organic pesticides only became commercially available in the 1940s. Prior to this time pesticides were predominantly heavy metal compounds.
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals and OCPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site.	Asbestos, lead and PCBs

4.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 4-2: CSM

Potential mechanism for contamination	Potential mechanisms for contamination include: • Fill material – importation of impacted material, 'top-down' impacts (e.g. placement of fill, leaching from surficial material etc), or sub-surface release (e.g. impacts from buried material); • Historical agricultural use – 'top-down' and spills (e.g. application of pesticides, refuelling or repairing machinery, and other activities at the ground surface level); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); and • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas).
Affected media	Soil/soil vapour and groundwater have been identified as potentially affected media.
Receptor identification	Human receptors include site occupants/users (teachers, support staff, maintenance staff and high school children), construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, and groundwater users (if any). Ecological receptors include terrestrial organisms and plants within unpaved areas (including any proposed landscaped areas and gardens), and freshwater ecology in the tributary of Rocky Creek.
Potential exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and future use of the site. Potential exposure pathways for ecological receptors include primary contact and ingestion. Exposure during future site use could occur via direct contact with soil in unpaved areas including gardens, inhalation of airborne asbestos fibres during soil disturbance, or inhalation of vapours within enclosed spaces such as buildings and basements. Exposure to groundwater is unlikely to occur in the tributary of Rocky Creek through direct migration, however groundwater has the potential to enter the creek via the stormwater system (which is expected to discharge into the creek) in a drained basement or de-watering scenario.

Potential exposure mechanisms	The following have been identified as potential exposure mechanisms for site contamination: • Vapour intrusion into any proposed basement and/or building (either from soil contamination or volatilisation of contaminants from groundwater); • Contact (dermal, ingestion or inhalation) with exposed soils in landscaped areas and/or unpaved areas; • Migration of groundwater off-site and into nearby water bodies, including aquatic ecosystems; and • Migration of groundwater off-site into areas where groundwater is being utilised as a resource (i.e. for domestic/stock).
Presence of preferential pathways for contaminant movement	The stormwater infrastructure may act as preferential pathways for contaminant migration. This would be dependent on the contaminant type and transport mechanisms.

5 SAMPLING, ANALYSIS AND QUALITY PLAN

5.1 Data Quality Objectives (DQO)

Data Quality Objectives (DQOs) were developed to define the type and quality of data required to achieve the project objectives outlined in Section 1.2. The DQOs were prepared with reference to the process outlined in Schedule B2 of NEPM (2013) and the Guidelines for the NSW Site Auditor Scheme, 3rd Edition (2017)[8]. The seven-step DQO approach for this project is outlined in the following sub-sections.

The DQO process is validated in part by the Data Quality Assurance/Quality Control (QA/QC) Evaluation. The Data (QA/QC) Evaluation is summarised in Section 5.1.5.2 and the detailed evaluation is provided in the appendices.

5.1.1 Step 1 - State the Problem

The CSM identified potential sources of contamination/AEC at the site that may pose a risk to human health and the environment. Investigation data is required to assess the contamination status of the site, assess the risks posed by the contaminants in the context of the proposed development/intended land use, and assess whether remediation is required. This information will be considered by the consent authority in exercising its planning functions in relation to the development proposal.

A waste classification is required prior to off-site disposal of excavated soil/bedrock.

The current investigation was undertaken to supplement the existing investigation data and to gather additional data to inform remediation planning.

The DQOs were developed by the author of this report and checked by the reviewer. Both the author and reviewer were joint decision-makers in relation to Step 2 of the DQO process.

The assessment was constrained in-part, by access limitations associated with the existing structures on site.

5.1.2 Step 2 - Identify the Decisions of the Study

The objectives of the assessment are outlined in Section 1.2. The decisions to be made reflect these objectives and are as follows:

- Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?
- Are any results above the SAC?
- Do potential risks associated with contamination exist, and if so, what are they?
- Is remediation required?

[8] NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme, 3rd ed.* (referred to as Site Auditor Guidelines 2017)

- Is the site characterisation sufficient to provide adequate confidence in the above decisions?
- Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

5.1.3 Step 3 - Identify Information Inputs

The primary information inputs required to address the decisions outlined in Step 2 include the following:

- Existing relevant environmental data from previous reports;
- Site information, including site observations and site history documentation;
- Sampling of potentially affected media, including soil and groundwater;
- Observations of sub-surface variables such as soil type, photo-ionisation detector (PID) concentrations, odours and staining, and groundwater physiochemical parameters;
- Laboratory analysis of soils and groundwater for the CoPC identified in the CSM; and
- Field and laboratory QA/QC data.

5.1.4 Step 4 - Define the Study Boundary

The sampling will be confined to the site boundaries as shown in Figure 2 (spatial boundary). The sampling was completed on 16 August 2018 and between 17 and 18 October 2018 (temporal boundary). The assessment of potential risk to adjacent land users has been made based on data collected within the site boundary.

Sampling was not undertaken within some of the existing structural footprints ie. Synthetic turf covered area and sports court.

5.1.5 Step 5 - Develop an Analytical Approach (or Decision Rule)

5.1.5.1 Tier 1 Screening Criteria

The laboratory data will be assessed against relevant Tier 1 screening criteria (referred to as SAC), as outlined in Section 6. Exceedances of the SAC do not necessarily indicate a requirement for remediation or a risk to human health and/or the environment. Exceedances are considered in the context of the CSM and valid SPR-linkages.

For this assessment, the individual results have been assessed as either above or below the SAC. Statistical evaluation of the dataset via calculation of mean values and/or 95% upper confidence limit (UCL) values has not been undertaken due to the spatial distribution of the data and the number of samples submitted for analysis.

5.1.5.2 Field and Laboratory QA/QC

Field QA/QC included analysis of inter-laboratory duplicates, intra-laboratory duplicates, trip spike, and trip blank samples. Further details regarding the sampling and analysis undertaken, and the acceptable limits adopted, is provided in the Data Quality (QA/QC) Evaluation in the appendices.

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the attached laboratory reports. These criteria were developed and implemented in accordance with the laboratory's National Association of Testing Authorities, Australia (NATA) accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

In the event that acceptable limits are not met by the laboratory analysis, other lines of evidence are reviewed (e.g. field observations of samples, preservation, handling etc) and, where required, consultation with the laboratory is undertaken in an effort to establish the cause of the non-conformance. Where uncertainty exists, EIS typically adopt the most conservative concentration reported (or in some cases, consider the data from the affected sample as an estimate).

5.1.5.3 Appropriateness of Practical Quantitation Limits (PQLs)

The PQLs of the analytical methods are considered in relation to the SAC to confirm that the PQLs are less than the SAC. In cases where the PQLs are greater than the SAC, a discussion of this is provided.

5.1.6 Step 6 – Specify Limits on Decision Errors

To limit the potential for decision errors, a range of quality assurance processes are adopted. A quantitative assessment of the potential for false positives and false negatives in the analytical results is undertaken with reference to Schedule B(3) of NEPM (2013) using the data quality assurance information collected.

Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. For this assessment, the null hypothesis has been adopted which is that, there is considered to be a complete SPR linkage for the CoPC identified in the CSM unless this linkage can be proven not to (or unlikely to) exist. The null hypothesis has been adopted for this assessment.

5.1.7 Step 7 - Optimise the Design for Obtaining Data

The most resource-effective design will be used in an optimum manner to achieve the assessment objectives. Adjustment of the assessment design can occur following consultation or feedback from project stakeholders. For this investigation, the design was optimised via consideration of the various lines of evidence used to select the sample locations, the media being sampled, and also by the way in which the data were collected.

The sampling plan and methodology are outlined in the following sub-sections.

5.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 5-1: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	Samples were collected from a combined 18 locations as shown on the attached Figure 2. Based on the site area (7,500m^2), this number of locations corresponded to a sampling density of approximately one sample per 417m^2. The sampling plan was not designed to meet the minimum sampling density for hotspot identification, as outlined in the NSW EPA Contaminated Sites Sampling Design Guidelines (1995)[9].
Sampling Plan	The sampling locations were placed on a judgemental sampling plan and were broadly positioned for site coverage, taking into consideration areas that were not easily accessible. This sampling plan was considered suitable to make an assessment of potential risks associated with the AEC and CoPC identified in the CSM, and assess whether further investigation is warranted. Sampling locations were also placed to target the footprint of the former buildings on site.
Set-out and Sampling Equipment	Sampling locations were set out using a tape measure. In-situ sampling locations were cleared for underground services by an external contractor prior to sampling as outlined in the SSP. Samples were collected using a drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) split-spoon sampler, or directly from the auger when conditions did not allow use of the SPT sampler.
Sample Collection and Field QA/QC	Soil samples were obtained on 16 August 2018 and between 17 and 18 October 2018 in accordance with the standard sampling procedure (SSP) attached in the appendices. Soil samples were collected from the fill and natural profiles based on field observations. The sample depths are shown on the logs attached in the appendices. Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.
Field Screening	A portable Photoionisation Detector (PID) fitted with a 10.6mV lamp was used to screen the samples for the presence of volatile organic compounds (VOCs). PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. PID calibration records are maintained on file by EIS.

[9] NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

Aspect	Input
	Fill/spoil at the sampling locations was visually inspected during the works for the presence of fibre cement fragments.
Decontami-nation and Sample Preservation	Sampling personnel used disposable nitrile gloves during sampling activities. Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. On completion of the fieldwork, the samples were stored temporarily in fridges in the EIS warehouse before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

5.3 Groundwater Sampling Plan and Methodology

The groundwater sampling plan and methodology is outlined in the table below:

Table 5-2: Groundwater Sampling Plan and Methodology

Aspect	Input
Sampling Plan	Groundwater monitoring wells were installed in BH102 (MW102) and BH111 (MW111). The wells were positioned to gain a snap-shot of the groundwater conditions. Considering the topography and the location of the nearest down-gradient water body, MW102 was considered to be in the up-gradient area of the site and would be expected to provide an indication of groundwater flowing onto (beneath) the site from the north-west. MW111 was considered to be in the intermediate to down-gradient area of the site and would be expected to provide an indication of groundwater flowing across (beneath) the site and beyond the down-gradient site boundary.
Monitoring Well Installation Procedure	The monitoring well construction details are documented on the appropriate borehole logs attached in the appendices. The monitoring wells were installed to depths of approximately 5.8m to 6.7m below ground level. The wells were generally constructed as follows: • 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater; • 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed); • A 2mm sand filter pack was used around the screen section for groundwater infiltration; • A hydrated bentonite seal/plug was used on top of the sand pack to seal the well; and • A gatic cover was installed at the surface with a concrete plug to limit the inflow of surface water.
Monitoring Well Development	The monitoring wells were developed on 18 October 2018 using a submersible electrical pump and dedicated disposable plastic bailer in accordance with the SSP. Due to the hydrogeological conditions, groundwater inflow into the wells was relatively low, therefore the wells were pumped until they were effectively dry.

Aspect	Input
	The field monitoring records and calibration data are attached in the appendices.
Groundwater Sampling	The monitoring wells were allowed to recharge for approximately five to seven days after development. Groundwater samples were obtained on 23 October 2018. Prior to sampling, the monitoring wells were checked for the presence of Light Non-Aqueous Phase Liquids (LNAPLs) using an inter-phase probe electronic dip meter. The monitoring well head space was checked for VOCs using a calibrated PID unit. The samples were obtained using a peristaltic pump. During sampling, the following parameters were monitored using calibrated field instruments (see SSP): • Standing water level (SWL) using an electronic dip meter; and • pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) using a YSI Multi-probe water quality meter. Steady state conditions were considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%. Groundwater samples were obtained directly from the single use PVC tubing and placed in the sample containers. Duplicate samples were obtained by alternate filling of sample containers. This technique was adopted to minimise disturbance of the samples and loss of volatile contaminants associated with mixing of liquids in secondary containers, etc. Groundwater removed from the wells during development and sampling was transported to EIS in jerry cans and stored in holding drums prior to collection by a licensed waste water contractor for off-site disposal. The field monitoring record and calibration data are attached in the appendices.
Decontaminant and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP attached in the appendices. During development, the pump was flushed between monitoring wells with potable water (single-use tubing was used for each well). The pump tubing was discarded after each sampling event and replaced therefore no decontamination procedure was considered necessary. The samples were preserved with reference to the analytical requirements and placed in an insulated container with ice in accordance with the SSP. On completion of the fieldwork, the samples were temporarily stored in a fridge at the EIS office, before being delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

5.4 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 5-3: Analytical Schedule

Analyte/CoPC	Fill Samples	Natural Soil Samples	Groundwater Samples
Heavy Metals	18	18	2
TRH/BTEX	18	18	2
PAHs	18	18	2
OCPs/OPPs	18	5	-
PCBs	18	5	-
Asbestos	18	-	-
pH/CEC/Clay Content (%)	-	3	-
pH/EC	-	-	2

5.4.1 Laboratory Analysis

Samples were analysed by an appropriate, NATA Accredited laboratory using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

Table 5-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blanks, and trip spike samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	198692, 203551, 203551-A and 203825
Inter-laboratory duplicates	SGS Alexandria Environmental NSW NATA Accreditation Number – 2562(4354) (ISO/IEC 17025 compliance)	SE185307

6 SITE ASSESSMENT CRITERIA (SAC)

The SAC were derived from the NEPM 2013 and other guidelines as discussed in the following sub-sections. The guideline values for individual contaminants are presented in the attached report tables and further explanation of the various criteria adopted is provided in the appendices.

6.1 Soil

Soil data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013) as outlined below.

6.1.1 Human Health

- Health Investigation Levels (HILs) for a 'public open space/secondary schools/and footpaths' exposure scenario (HIL-C);
- Health Screening Levels (HSLs) for a 'low-high density residential' exposure scenario (HSL-A & HSL-B). HSLs were calculated based on the soil type and the depth of the sample from the existing ground surface as the proposed development is expected to be constructed approximately at the existing grade. Although HSLs are not intended to be applied to bedrock, the bedrock results were assessed against the HSLs derived using the most conservative criteria (i.e. sand and a 0m to 2m depth interval) to allow for an initial assessment of potential risk;
- Where exceedances of the HSLs were reported for hydrocarbons (TRH/BTEX and naphthalene), the soil health screening levels for direct contact presented in the CRC Care Technical Report No. 10 – Heath screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document (2011)[10] were considered; and
- Asbestos was assessed on the basis of presence/absence. Asbestos HSLs were not adopted as detailed asbestos quantification was not undertaken.

6.1.2 Environment (Ecological – terrestrial ecosystems)

- Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for an 'urban residential and public open space' (URPOS) exposure scenario. These have been applied to the top 4.5m of soil. The criteria for benzo(a)pyrene has been increased from the value presented in NEPM (2013) based on the information presented in the CRC Care Technical Report No. 39 – Risk-based management and guidance for benzo(a)pyrene (2017)[11];
    - ESLs were calculated based on the soil type. EILs for selected metals were calculated using average site specific soil parameters for pH (5.1), cation exchange capacity (2.7 cmolc/kg) and clay content (35.7 % clay). These were average values. These data were used to select the added contaminant limit (ACL) values presented in Schedule B(1) of NEPM (2013), and published ambient background concentration (ABC) presented in the document titled Trace

[10] Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC Care), (2011). Technical Report No. 10 - *Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document*

[11] CRC Care, (2011). *Technical Report No. 39 - Risk-based management and guidance for benzo(a)pyrene*

Element Concentrations in Soils from Rural and Urban Areas of Australia (1995)[12]. This method is considered to be adequate for the Tier 1 screening.

6.1.3 Management Limits for Petroleum Hydrocarbons

Management limits for petroleum hydrocarbons (as presented in Schedule B1 of NEPM 2013) were considered (if required) following evaluation of human health and ecological risks, and risks to groundwater.

6.1.4 Waste Classification

Data for the waste classification assessment were assessed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (2014)[13] as outlined in the following table:

Table 6-1: Waste Categories

Category	Description
General Solid Waste (non-putrescible)	• If Specific Contaminant Concentration (SCC) ≤ Contaminant Threshold (CT1) then Toxicity Characteristics Leaching Procedure (TCLP) not needed to classify the soil as general solid waste; and • If TCLP ≤ TCLP1 and SCC ≤ SCC1 then treat as general solid waste.
Restricted Solid Waste (non-putrescible)	• If SCC ≤ CT2 then TCLP not needed to classify the soil as restricted solid waste; and • If TCLP ≤ TCLP2 and SCC ≤ SCC2 then treat as restricted solid waste.
Hazardous Waste	• If SCC > CT2 then TCLP not needed to classify the soil as hazardous waste; and • If TCLP > TCLP2 and/or SCC > SCC2 then treat as hazardous waste.
Virgin Excavated Natural Material (VENM)	Natural material (such as clay, gravel, sand, soil or rock fines) that meet the following: • That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial mining or agricultural activities; • That does not contain sulfidic ores or other waste; and • Includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette.

[12] Olszowy, H., Torr, P., and Imray, P., (1995), *Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4*. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission.

[13] NSW EPA, (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

6.2 Groundwater

Groundwater data were compared to relevant Tier 1 screening criteria in accordance with NEPM (2013), following an assessment of environmental values in accordance with the Guidelines for the Assessment and Management of Groundwater Contamination (2007)[14]. Environmental values for this assessment include aquatic ecosystems, human uses, and human-health risks in non-use scenarios.

6.2.1 Human Health

- HSLs for a 'low-high density residential' exposure scenario (HSL-A/HSL-B). HSLs were calculated based on the soil type and the observed depth to groundwater;
- The Australian Drinking Water Guidelines (2011)[15] were adopted as screening criteria for consumption of groundwater; and
- The guidelines for recreational water quality (primary and secondary contact) presented in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)[16] were adopted as screening criteria to assess potential human-health risks in the nearest receiving water body to assess risks associated with incidental contact with groundwater.
- Based on the data collected during the investigation there is the potential for the groundwater at some locations in the site to be less than 2.0m below the final levels of the site. On this basis, EIS have undertaken a site specific assessment (SSA) for the Tier 1 screening of human health risks posed by volatile contaminants in groundwater. The assessment included selection of alternative Tier 1 criteria that were considered suitably protective of human health. These criteria are based on drinking water guidelines and have been referred to as HSL-SSA. The criteria were based on the following (as shown in the attached report tables):
    - Australian Drinking Water Guidelines (2011)[17] for BTEX compounds and selected VOCs;
    - World Health Organisation (WHO) document titled Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality (2008)[18] for petroleum hydrocarbons;
    - USEPA Region 9 screening levels for naphthalene (threshold value for tap water); and
    - The use of the laboratory PQLs for other contaminants where there were no Australian guidelines.

[14] NSW Department of Environment and Conservation, (2007). *Guidelines for the Assessment and Management of Groundwater Contamination*

[15] National Health and Medical Research Council (NHMRC), (2011). *National Water Quality Management Strategy, Australian Drinking Water Guidelines* (referred to as ADWG 2011)

[16] ANZECC, (2000), *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* (referred to as ANZECC 2000)

[17] National Health and Medical Research Council (NHMRC), (2011). *National Water Quality Management Strategy, Australian Drinking Water Guidelines* (referred to as ADWG 2011)

[18] World Health Organisation (WHO), (2008). *Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality* (referred to as WHO 2008)

6.2.2 Environment (Ecological - aquatic ecosystems)

- Groundwater Investigation Levels (GILs) for 95% trigger values for protection of freshwater presented in ANZECC 2000. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist.

7 RESULTS

7.1 Summary of Data (QA/QC) Evaluation

The data evaluation is presented in the appendices. In summary, EIS are of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

7.2 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

Table 7-1: Summary of Subsurface Conditions

Profile	Description
Fill	Fill was encountered at the surface in all boreholes and extended to depths of approximately 0.2m to 3.4m. The fill typically comprised sand, silty sand, silty clay, sandy clay and clayey silt with inclusions of bark material, root fibres, sand, siltstone gravel, ironstone gravel, igneous gravel, ash, slag and glass fragments. An ironstone boulder was also encountered in the fill in BH105 at approximately 0.6m bgl. No staining or odours were noted in the fill. No potential asbestos containing material (ACM) was noted in the fill.
Natural Soil	Natural material was encountered below the fill in all boreholes, except at BH106 and BH113, at depths of approximately 0.2m to 3.4m. The natural material typically comprised silty clay, silty sandy clay and sandy clay with inclusions of root fibres, ironstone gravel and sand. No staining or odours were noted in the natural material.
Bedrock	Bedrock was encountered below the fill and/or natural material in all boreholes, except at BH104, BH105, BH107, BH108, BH109, BH110, and BH112, at depths of approximately 0.4m to 4.0m bgl. Boreholes BH104, BH105, BH107, BH108, BH109, BH110, and BH112 were terminated in the natural material. Bedrock typically comprised siltstone and sandstone with silty clay, sandy clay, iron indurated bands and siltstone bands. No staining or odours were noted in the bedrock.
Groundwater	Groundwater seepage was encountered in the boreholes BH4, BH108 and BH110 during drilling. All other boreholes remained dry on completion of drilling and a short time after.

7.3 Field Screening

A summary of the field screening results are presented in the table below.

Table 7-2: Summary of Field Screening

Aspect	Details
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The results ranged from 0ppm to 51ppm equivalent isobutylene. These results indicate PID detectable VOCs. Samples with elevated PID readings were analysed for TRH and BTEX.
Groundwater Depth & Flow	Groundwater seepage was encountered in boreholes BH108, and BH110 during drilling at depths of approximately 1.3m to 3.5m bgl. A standing water level (SWL) was measured in boreholes BH4 and BH110 at depths ranging from 1.0m to 4.5m bgl a short time after completion of drilling. The remaining boreholes were dry during and a short time after completion of drilling. SWLs measured in the monitoring wells (MW102 and MW111) installed at the site ranged from 2.7m to 4.6m bgl.
Groundwater Field Parameters	Field measurements recorded during sampling were as follows: - pH ranged from 5.21 to 5.92; - EC ranged from 431.7µS/cm to 674.0µS/cm; - Eh ranged from -50.3mV to -77.9mV; and - DO ranged from 1.7ppm to 2.7ppm.
LNAPLs petroleum hydrocarbons	Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

7.4 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below:

7.4.1 Human Health and Environmental (Ecological) Assessment

Table 7-3: Summary of Soil Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	All heavy metals results were below the SAC.
TRH	All TRH results were below the SAC.
BTEX	All BTEX results were below the SAC.

Analyte	Results Compared to SAC
PAHs	All PAH results were below the SAC.
OCPs and OPPs	All OCP and OPP results were below the SAC.
PCBs	All PCB results were below the SAC.
Asbestos	All asbestos results were below the SAC (i.e. asbestos was absent in the samples analysed for the investigation).

7.4.2 Waste Classification Assessment

The laboratory results were assessed against the criteria presented in Part 1 of the Waste Classification Guidelines, as summarised previously in this report. The results are presented in the report tables attached in the appendices. A summary of the results is presented below.

Table 7-4: Summary of Soil Laboratory Results Compared to CT and SCC Criteria

Analyte	No. of Samples Analysed	No. of Results > CT Criteria	No. of Results > SCC Criteria	Comments
Heavy Metals	36	0	0	-
TRH	36	0	0	-
BTEX	36	0	0	-
Total PAHs	36	0	0	-
Benzo(a)pyrene	36	0	0	-
OCPs & OPPs	23	0	0	-
PCBs	23	0	0	-
Asbestos	18	-	-	Asbestos was not detected in the samples analysed.

7.5 Groundwater Laboratory Results

The groundwater laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below:

Table 7-5: Summary of Groundwater Laboratory Results – Human Health and Environmental (Ecological)

Analyte	Results Compared to SAC
Heavy Metals	Concentrations of nickel was above the ecological SAC in MW102. The concentrations of zinc was above the ecological SAC in MW102 and MW111. All other heavy metals results were below the SAC.
TRH	All TRH results were below the SAC.
BTEX	All BTEX results were below the SAC.
Other VOCs	All VOCs results were below the SAC.
PAHs	All PAH results were below the SAC.
Other Parameters	The results for pH and EC are summarised below: • pH ranged from 5.0 to 5.9. This is below the range for the human health and ecological SACs; and • EC ranged from 520µS/cm to 1,200µS/cm.

8 WASTE CLASSIFICATION ASSESSMENT

8.1 Waste Classification of Fill

Based on the results of the assessment, and at the time of reporting, the fill material is classified as **General Solid Waste (non-putrescible)**. Surplus fill should be disposed of to a facility that is appropriately licensed to receive this waste stream. The facility should be contacted to obtain the required approvals prior to commencement of excavation.

8.2 Classification of Natural Soil and Bedrock

Based on the scope of work undertaken for this assessment, and at the time of reporting, EIS are of the opinion that the natural soil and bedrock at the site meets the definition of **VENM** for off-site disposal or re-use purposes. VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. In accordance with Part 1 of the Waste Classification Guidelines, the VENM is pre-classified as general solid waste and can also be disposed of accordingly to a facility that is licensed to accept it.

9 DISCUSSION AND CONCLUSIONS

9.1 Tier 1 Risk Assessment and Review of CSM

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

9.1.1 Soil

Concentrations of the COPCs were not encountered above the SACs in the soil samples analysed.

Currently, there is an incomplete SPR linkage for human health and ecological receptors in relation to the COPCs. Therefore the potential for adverse risks to human health and ecology is relatively low.

9.1.2 Groundwater

Concentrations of nickel and zinc were encountered above the ecological SAC in groundwater. The elevated concentrations of these heavy metals could be attributed to naturally occurring background levels in the soil. These heavy metals are also often associated with leaking water infrastructure and are commonly encountered in urban groundwater. On this basis the groundwater impact from the heavy metals will not be considered any further.

A minor concentration of the VOC compound chloroform was also encountered in MW102. However this concentration was below the SAC. Chloroform is often detected in drinking water and is a bi-product of the disinfection process. The presence of chloroform may be an indication of leaking water infrastructure in the vicinity of MW102.

The groundwater results are not considered to be significant and are not considered to pose a risk to human or ecological receptors.

9.2 Decision Statements

The decision statements are addressed below:

> *Did the site inspection, or does the historical information identify potential contamination sources/AEC at the site?*

The historical assessment identified various potential sources of contamination/AEC, including fill, historical agricultural land use and hazardous building materials (i.e. from former demolition).

Agricultural/horticultural activities are listed in Table 1 of the SEPP55 Planning Guidelines as activities that may cause contamination.

Are any results above the SAC?

None of the soil results were above the SAC. Concentrations of nickel and zinc were encountered above the ecological SAC in the groundwater samples. These results are not considered to be significant.

Do potential risks associated with contamination exist, and if so, what are they?

EIS are of the opinion that potential risks associated with contamination within the site is low.

Is remediation required?

EIS are of the opinion that remediation is not required.

Is the site characterisation sufficient to provide adequate confidence in the above decisions?

Yes.

Is the site suitable for the proposed development, or can the site be made suitable subject to further characterisation and/or remediation?

The site is considered to be suitable for the proposed development.

10 CONCLUSIONS AND RECOMMENDATIONS

An intrusive soil sampling and groundwater assessment was undertaken for this investigation. A review of the EIS Preliminary Stage 1/2 ESA report was undertaken and the data was also incorporated within this assessment.

Based on the scope of work undertaken for this assessment and the data obtained from the EIS Preliminary Stage 1/2 ESA report, EIS identified the following potential contamination sources/AEC:

- Fill material;
- Historical agricultural use (orchards);
- Use of pesticides; and
- Hazardous building materials present on site.

The site was potentially used for agricultural (orchards) purposes prior to 1943 and a building was present in the south-eastern section. Potential filling of the site may have occurred and the high school was progressively built from circa 1961 onwards. The former site structures were also demolished around this time.

The intrusive soil investigation undertaken during this assessment did not encounter concentrations of contaminants above the SAC. The groundwater samples encountered concentrations of nickel and zinc above the ecological SAC. However this was attributed to commonly encountered heavy metals in urban groundwater and was not considered to be a significant risk at the site.

EIS consider that the report objectives outlined in Section 1.2 have been addressed.

Based on the findings of the assessment, EIS are of the opinion that the site is suitable for the proposed development described in Section 1.1. There is considered to be a relatively low potential for contamination-related unexpected finds to occur at the site during the proposed development works. Unexpected finds would typically be able to be identified by visual or olfactory indicators and could include:

- Waste materials in fill, including building and demolition waste;
- Fibre cement fragments (e.g. ACM);
- Stained fill/soil;
- Odorous soils (e.g. hydrocarbon odours); and/or
- Ash, slag and/or coal wash.

The following should be implemented in the event of an unexpected find:

- All work in the immediate vicinity should cease and temporary barricades should be erected to isolate the area;

- A suitably qualified contaminated land consultant[19] should be engaged to inspect the find and provide advice on the appropriate course of action; and
- Any actions should be implemented and validated to demonstrate that there are no unacceptable risks to the receptors.

At this stage, EIS consider that there is no requirement to notify the NSW EPA Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997 (2015)[20].

[19] EIS recommend that the consultancy engaged for the work be a member of the Australian Contaminated Land Consultants Associated (ACLCA), and/or the individual undertaking the works be certified under one of the NSW EPA endorsed certified practitioner schemes

[20] NSW EPA, (2015). *Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997* (referred to as Duty to Report Contamination)

11 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

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IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations

Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

REPORT FIGURES

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

This plan should be read in conjunction with the EIS report.

Title: **SITE LOCATION PLAN**

Location: ST IVES HIGH SCHOOL
ST IVES, NSW

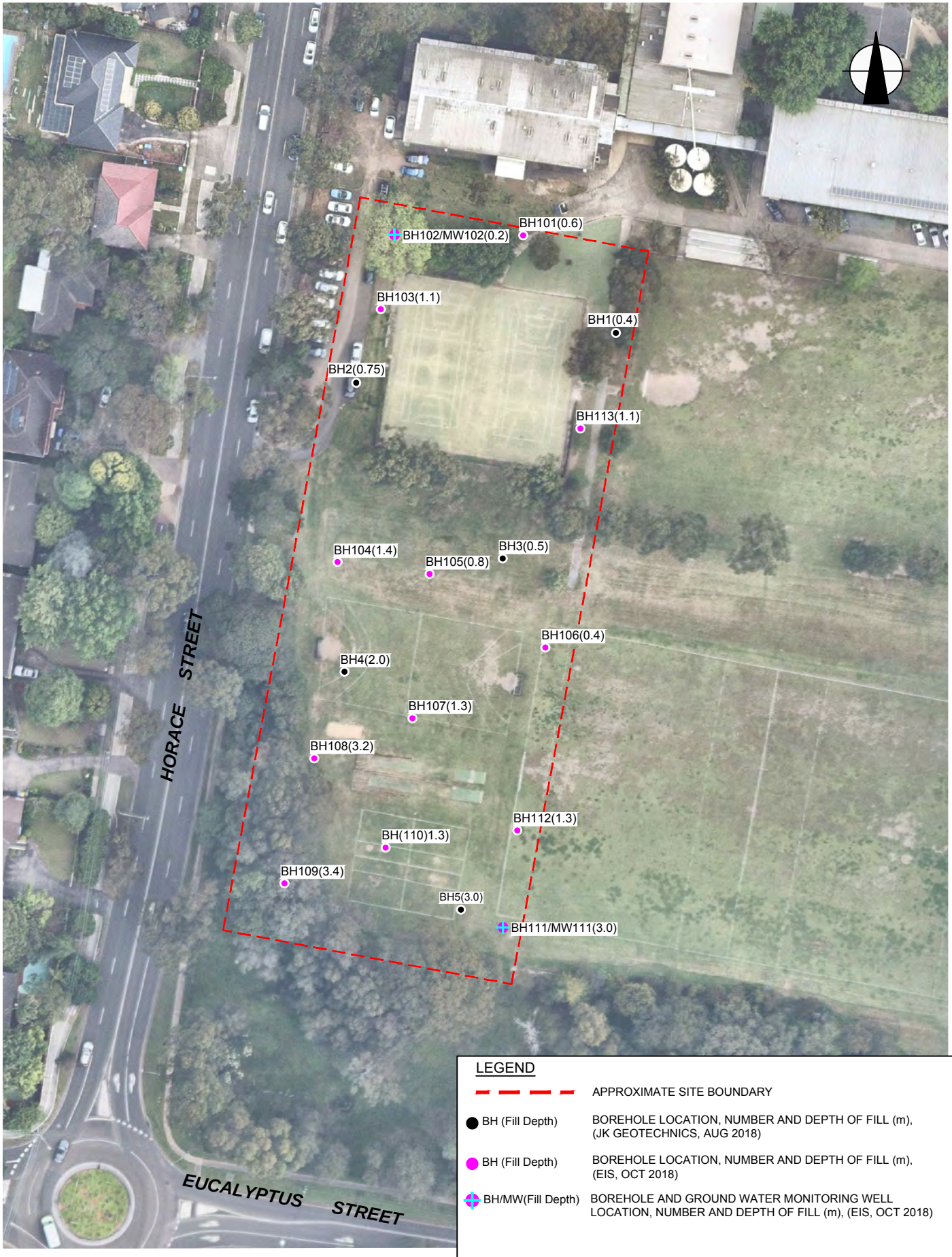
Report No: E31754KT

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

PLOT DATE: 29/08/2018 11:17:55 AM DWG FILE: S:\5 EIS\5C EIS JOBS\31000'S\E31754KT ST IVES HS\CAD\E31754KT.DWG



LEGEND

APPROXIMATE SITE BOUNDARY	
BH (Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (JK GEOTECHNICS, AUG 2018)
BH (Fill Depth)	BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS, OCT 2018)
BH/MW(Fill Depth)	BOREHOLE AND GROUND WATER MONITORING WELL LOCATION, NUMBER AND DEPTH OF FILL (m), (EIS, OCT 2018)

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 02 NOV 2018.

0 10 20 30 40 50

SCALE 1:1000 @A4 METRES

This plan should be read in conjunction with the EIS report.

Title: **SAMPLE LOCATION PLAN**

Location: ST IVES HIGH SCHOOL
ST IVES, NSW

Report No: E31754KT

Figure No: 2

ENVIRONMENTAL INVESTIGATION SERVICES

PLOT DATE: 15/11/2018 2:35:53 PM DWG FILE: S:\5 EIS\5C- EIS JOBS\31000'S\E31754KT ST IVES HS\CAD\E31754KT.DWG

LABORATORY SUMMARY TABLES

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ABC: Ambient Background Concentration
ACM: Asbestos Containing Material
ADWG: AustralianDrinking Water Guidelines
AF: Asbestos Fines
ANZECC: Australian and New Zealand Environment Conservation Council
B(a)P: Benzo(a)pyrene
CEC: Cation Exchange Capacity
CRC: Cooperative Research Centre
CT: Contaminant Threshold
EILs: Ecological Investigation Levels
ESLs: Ecological Screening Levels
FA: Fibrous Asbestos
GIL: Groundwater Investigation Levels
HILs: Health Investigation Levels
HSLs: Health Screening Levels
HSL-SSA: Health Screening Level-SiteSpecific Assessment
NA: Not Analysed
NC: Not Calculated
NEPM: National Environmental Protection Measure
NHMRC: National Health and Medical Research Council
NL: Not Limiting
NSL: No Set Limit
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PAHs: Polycyclic Aromatic Hydrocarbons
ppm: Parts per million
PCBs: Polychlorinated Biphenyls
PCE: Perchloroethylene (Tetrachloroethylene or Teterachloroethene)
pH_{KCL} : pH of filtered 1:20, 1M KCL extract, shaken overnight
pH_{ox} : pH of filtered 1:20 1M KCl after peroxide digestion
PQL: Practical Quantitation Limit
RS: Rinsate Sample
RSL: Regional Screening Levels
SAC: Site Assessment Criteria
SCC: Specific Contaminant Concentration
S_{Cr}: Chromium reducible sulfur
S_{POS}: Peroxide oxidisable Sulfur
SSA: Site Specific Assessment
SSHSLs: Site Specific Health Screening Levels
TAA: Total Actual Acidity in 1M KCL extract titrated to pH6.5
TB: Trip Blank
TCA: 1,1,1 Trichloroethane (methyl chloroform)
TCE: Trichloroethylene (Trichloroethene)
TCLP: Toxicity Characteristics Leaching Procedure
TPA: Total Potential Acidity, 1M KCL peroxide digest
TS: Trip Spike
TRH: Total Recoverable Hydrocarbons
TSA: Total Sulfide Acidity (TPA-TAA)
UCL: Upper Level Confidence Limit on Mean Value
USEPA United States Environmental Protection Ager
VOCC: Volatile Organic Chlorinated Compounds
WHO: World Health Organisation

Table Specific Explanations:

HIL Tables:

- The chromium results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.
- Carcinogenic PAHs is a toxicity weighted sum of analyte concentrations for a specific list of PAH compounds relative to B(a)P. It is also refered to as the B(a)P Toxic Equivalence Quotient (TEQ).
- Statistical calculations are undertaken using ProUCL (USEPA). Statistical calculation is usually undertaken using data from fill samples.

EIL/ESL Table:

- ABC Values for selected metals have been adopted from the published background concentrations presented in Olszowy et. al., (1995), Trace Element Concentrations in Soils from Rural and Urban New South Wales (the 25th percentile values for old suburbs with high traffic have been quoted).

Waste Classification and TCLP Table:

- Data assessed using the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (2014).
- The assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion.
- Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde.

TABLE A

SOIL LABORATORY RESULTS COMPARED TO NEPM 2013.

HIL-C: 'Public open space; secondary schools; and footpaths'

All data in mg/kg unless stated otherwise			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	Carcinogenic PAHs	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC)			300	90	300	17000	600	80	1200	30000	300	3	10	340	400	10	70	400	10	250	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0.1-0.2	Fill: silty sand	9	<0.4	12	14	17	0.2	7	29	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH1	0.6-0.95	Silty clay	<4	<0.4	4	7	17	<0.1	<1	4	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH2	0-0.1	Fill: silty sand	4	<0.4	10	11	26	<0.1	5	30	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH2	1.5-1.6	Silty clay	6	<0.4	14	10	19	<0.1	1	3	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH3	0-0.1	Fill: sandy silt	9	<0.4	12	40	24	0.1	3	19	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH3	0.6-0.95	Silty clay	10	<0.4	19	11	23	<0.1	<1	2	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH4	0-0.1	Fill: sandy silt	<4	<0.4	7	10	23	<0.1	3	30	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH4	3.2-3.45	Silty clay	<4	<0.4	5	<1	14	<0.1	<1	1	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA
BH5	0-0.1	Fill: sandy silt	<4	<0.4	6	6	15	<0.1	2	27	3.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH5	3.2-3.45	Silty clay	6	<0.4	14	11	19	<0.1	2	10	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	NA
BH101	0.0-0.2	Fill: silty clay	8	0.6	16	23	41	0.2	8	94	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH101	0.7-0.95	Silty clay	8	<0.4	13	31	27	0.8	3	9	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH102	0.0-0.2	Fill: silty sand	<4	<0.4	8	17	100	<0.1	3	140	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH102	0.7-0.95	Silty clay	7	<0.4	14	14	18	<0.1	1	7	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH103	0.0-0.2	Fill: silty sand	6	<0.4	20	18	30	<0.1	16	38	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH103	1.1-1.3	Silty clay	16	<0.4	19	12	17	0.2	2	6	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH104	0.05-0.1	Fill:silty clay	6	<0.4	14	4	19	<0.1	1	6	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH104	1.8-1.95	Silty sandy clay	6	<0.4	14	5	11	<0.1	2	7	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH105	0.0-0.1	Fill:silty clay	5	<0.4	12	7	20	<0.1	2	12	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH105	1.1-1.4	Silty clay	8	<0.4	8	5	19	<0.1	<1	4	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH106	0.0-0.2	Fill: silty sand	<4	<0.4	7	10	17	<0.1	3	32	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH106	0.6-0.8	Sandstone	8	<0.4	8	10	11	<0.1	2	12	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH107	0.7-0.95	Fill: silty clay	6	<0.4	13	4	21	<0.1	2	13	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	Not Detected
BH107	1.8-1.95	Sandy clay	<4	<0.4	11	<1	17	<0.1	<1	<1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH108	0.0-0.2	Fill: silty sand	<4	<0.4	9	11	24	<0.1	3	36	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH108	4.2-4.5	Silty clay	8	<0.4	21	5	10	0.2	<1	4	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH109	1.6-1.95	Fill: silty clay	5	<0.4	21	3	16	<0.1	5	23	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH109	3.8-4.0	Sandy clay	4	<0.4	17	3	11	<0.1	1	3	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH110	0.5-0.7	Fill: silty clay	7	<0.4	12	5	24	<0.1	2	25	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH110	1.6-1.95	Silty clay	20	<0.4	7	16	13	<0.1	1	3	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH111	0.7-0.95	Fill: silty clay	7	<0.4	19	4	79	0.2	2	27	0.2	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH111	3.3-3.45	Silty clay	5	<0.4	20	2	10	<0.1	1	5	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH112	0.7-0.95	Fill: silty clay	19	<0.4	14	7	11	<0.1	1	6	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH112	1.4-1.5	Silty clay	6	<0.4	20	5	15	<0.1	<1	2	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH113	0.0-0.2	Fill: silty sand	5	<0.4	9	12	25	<0.1	3	32	<0.05	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Not Detected
BH113	1.1-1.2	Siltstone	4	<0.4	4	7	17	<0.1	<1	1	<0.05	<0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples			36	36	36	36	36	36	36	36	36	36	23	23	23	23	23	23	23	23	23	18
Maximum Value			20	0.6	21	40	100	0.8	16	140	3.1	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	0.2	<PQL	<PQL	<PQL	NC

Concentration above the SAC **VALUE**

TABLE B
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Field PID Measurement
PQL - Envirolab Services					25	50	0.2	0.5	1	1	1	ppm
NEPM 2013 HSL Land Use Category					**HSL-A/B:LOW/HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0.1-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH1	0.6-0.95	Silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	51
BH2	0-0.1	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	3.8
BH2	1.5-1.6	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	1.7
BH3	0-0.1	Fill: sandy silt	0m to < 1m	Silt	<25	64	<0.2	<0.5	<1	<1	<1	0.3
BH3	0.6-0.95	Silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH4	0-0.1	Fill: sandy silt	0m to < 1m	Silt	<25	<50	<0.2	<0.5	<1	<1	<1	1.8
BH4	3.2-3.45	Silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.7
BH5	0-0.1	Fill: sandy silt	0m to < 1m	Silt	<25	<50	<0.2	<0.5	<1	<1	<1	0.6
BH5	3.2-3.45	Silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH101	0.0-0.2	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH101	0.7-0.95	Silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.4
BH102	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH102	0.7-0.95	Silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.5
BH103	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH103	1.1-1.3	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH104	0.05-0.1	Fill:silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH104	1.8-1.95	Silty sandy clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH105	0.0-0.1	Fill:silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH105	1.1-1.4	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.1
BH106	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH106	0.6-0.8	Sandstone	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH107	0.7-0.95	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH107	1.8-1.95	Sandy clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH108	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH108	4.2-4.5	Silty clay	4m+	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH109	1.6-1.95	Fill: silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	4.4
BH109	3.8-4.0	Sandy clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.8
BH110	0.5-0.7	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH110	1.6-1.95	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH111	0.7-0.95	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH111	3.3-3.45	Silty clay	2m to <4m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	3.6
BH112	0.7-0.95	Fill: silty clay	0m to < 1m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0.5
BH112	1.4-1.5	Silty clay	1m to <2m	Clay	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH113	0.0-0.2	Fill: silty sand	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	0
BH113	1.1-1.2	Siltstone	0m to < 1m	Sand	<25	<50	<0.2	<0.5	<1	<1	<1	20.2
Total Number of Samples					36	36	36	36	36	36	36	36
Maximum Value					<PQL	64	<PQL	<PQL	<PQL	<PQL	<PQL	51

Concentration above the SAC **VALUE**

The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

TABLE C
SOIL LABORATORY RESULTS COMPARED TO NEPM 2013 EILs AND ESLs
All data in mg/kg unless stated otherwise

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																				
							AGED HEAVY METALS-EILs						EILs		ESLs									
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.1-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	9	12	14	17	7	29	<0.1	<0.1	<25	<50	130	<100	<0.2	<0.5	<1	<1	<0.05
BH1	0.6-0.95	Silty clay	Fine	5.1	2.7	35.7	<4	4	7	17	<1	4	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	0-0.1	Fill: silty sand	Coarse	5.1	2.7	35.7	4	10	11	26	5	30	0.2	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH2	1.5-1.6	Silty clay	Fine	5.1	2.7	35.7	6	14	10	19	1	3	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH3	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	9	12	40	24	3	19	<0.1	<0.1	<25	64	110	<100	<0.2	<0.5	<1	<1	<0.05
BH3	0.6-0.95	Silty clay	Fine	5.1	2.7	35.7	10	19	11	23	<1	2	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH4	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	<4	7	10	23	3	30	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH4	3.2-3.45	Silty clay	Fine	5.1	2.7	35.7	<4	5	<1	14	<1	1	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH5	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	<4	6	6	15	2	27	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.3
BH5	3.2-3.45	Silty clay	Fine	5.1	2.7	35.7	6	14	11	19	2	10	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101	0.0-0.2	Fill: silty clay	Fine	5.1	2.7	35.7	8	16	23	41	8	94	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH101	0.7-0.95	Silty clay	Fine	5.1	2.7	35.7	8	13	31	27	3	9	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	<4	8	17	100	3	140	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH102	0.7-0.95	Silty clay	Fine	5.1	2.7	35.7	7	14	14	18	1	7	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH103	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	6	20	18	30	16	38	<0.1	<0.1	<25	<50	100	<100	<0.2	<0.5	<1	<1	<0.05
BH103	1.1-1.3	Silty clay	Fine	5.1	2.7	35.7	16	19	12	17	2	6	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH104	0.05-0.1	Fill:silty clay	Fine	5.1	2.7	35.7	6	14	4	19	1	6	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH104	1.8-1.95	Silty sandy clay	Fine	5.1	2.7	35.7	6	14	5	11	2	7	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH105	0.0-0.1	Fill:silty clay	Fine	5.1	2.7	35.7	5	12	7	20	2	12	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH105	1.1-1.4	Silty clay	Fine	5.1	2.7	35.7	8	8	5	19	<1	4	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH106	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	<4	7	10	17	3	32	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH106	0.6-0.8	Sandstone	Fine	5.1	2.7	35.7	8	8	10	11	2	12	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH107	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	6	13	4	21	2	13	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH107	1.8-1.95	Sandy clay	Fine	5.1	2.7	35.7	<4	11	<1	17	<1	<1	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH108	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	<4	9	11	24	3	36	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH108	4.2-4.5	Silty clay	Fine	5.1	2.7	35.7	8	21	5	10	<1	4	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH109	1.6-1.95	Fill: silty clay	Fine	5.1	2.7	35.7	5	21	3	16	5	23	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH109	3.8-4.0	Sandy clay	Fine	5.1	2.7	35.7	4	17	3	11	1	3	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH110	0.5-0.7	Fill: silty clay	Fine	5.1	2.7	35.7	7	12	5	24	2	25	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH110	1.6-1.95	Silty clay	Fine	5.1	2.7	35.7	20	7	16	13	1	3	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH111	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	7	19	4	79	2	27	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	0.05
BH111	3.3-3.45	Silty clay	Fine	5.1	2.7	35.7	5	20	2	10	1	5	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH112	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	19	14	7	11	1	6	<0.1	<0.1	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH112	1.4-1.5	Silty clay	Fine	5.1	2.7	35.7	6	20	5	15	<1	2	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
BH113	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	5	9	12	25	3	32	<0.1	<0.1	<25	<50	130	<100	<0.2	<0.5	<1	<1	<0.05
BH113	1.1-1.2	Siltstone	Fine	5.1	2.7	35.7	4	4	7	17	<1	1	<0.1	NA	<25	<50	<100	<100	<0.2	<0.5	<1	<1	<0.05
Total Number of Samples				36	36	36	36	36	36	36	36	36	36	23	36	36	36	36	36	36	36	36	36
Raw Max				5.1	2.7	35.7	20	21	40	100	16	140	0.2	0	0	64	130	0	0	0	0	0	0.3
Maximum Value				5.1	2.7	35.7	20	21	40	100	16	140	0.2	<PQL	<PQL	64	130	<PQL	<PQL	<PQL	<PQL	<PQL	0.3

Concentration above the SAC — VALUE — Average Values — VALUE

The guideline corresponding to the elevated value is highlighted in grey in the EIL and ESL Assessment Criteria Table below

EIL AND ESL ASSESSMENT CRITERIA

Land Use Category				URBAN RESIDENTIAL AND PUBLIC OPEN SPACE																				
							AGED HEAVY METALS-EILs						EILs		ESLs									
				pH	CEC ($cmol_c/kg$)	Clay Content (% clay)	Arsenic	Chromium	Copper	Lead	Nickel	Zinc	Naphthalene	DDT	C_6-C_{10} (F1)	$>C_{10}$-C_{16} (F2)	$>C_{16}$-C_{34} (F3)	$>C_{34}$-C_{40} (F4)	Benzene	Toluene	Ethylbenzene	Total Xylenes	B(a)P
PQL - Envirolab Services				-	1	-	4	1	1	1	1	1	0.1	0.1	25	50	100	100	0.2	0.5	1	3	0.05
Ambient Background Concentration (ABC)				-	-	-	NSL	13	28	163	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH1	0.1-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH1	0.6-0.95	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH2	0-0.1	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH2	1.5-1.6	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH3	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH3	0.6-0.95	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH4	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH4	3.2-3.45	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH5	0-0.1	Fill: sandy silt	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH5	3.2-3.45	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH101	0.0-0.2	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH101	0.7-0.95	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH102	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH102	0.7-0.95	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH103	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH103	1.1-1.3	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH104	0.05-0.1	Fill:silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH104	1.8-1.95	Silty sandy clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH105	0.0-0.1	Fill:silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH105	1.1-1.4	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH106	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH106	0.6-0.8	Sandstone	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH107	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH107	1.8-1.95	Sandy clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH108	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH108	4.2-4.5	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH109	1.6-1.95	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH109	3.8-4.0	Sandy clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH110	0.5-0.7	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH110	1.6-1.95	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH111	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH111	3.3-3.45	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH112	0.7-0.95	Fill: silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	1300	5600	60	105	125	45	33
BH112	1.4-1.5	Silty clay	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33
BH113	0.0-0.2	Fill: silty sand	Coarse	5.1	2.7	35.7	100	413	123	1263	35	302	170	180	180	120	300	2800	50	85	70	105	33
BH113	1.1-1.2	Siltstone	Fine	5.1	2.7	35.7	100	413	123	1263	35	302	170	--	180	120	1300	5600	60	105	125	45	33

TABLE D
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful	Total Scheduled	PCBs	C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.2	0.5	1	3	100
General Solid Waste CT1			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	<50	<50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0.1-0.2	Fill: silty sand	9	<0.4	12	14	17	0.2	7	29	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	110	110	<0.2	<0.5	<1	<1	Not Detected
BH1	0.6-0.95	Silty clay	<4	<0.4	4	7	17	<0.1	<1	4	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH2	0-0.1	Fill: silty sand	4	<0.4	10	11	26	<0.1	5	30	0.2	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH2	1.5-1.6	Silty clay	6	<0.4	14	10	19	<0.1	1	3	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH3	0-0.1	Fill: sandy silt	9	<0.4	12	40	24	0.1	3	19	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH3	0.6-0.95	Silty clay	10	<0.4	19	11	23	<0.1	<1	2	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH4	0-0.1	Fill: sandy silt	<4	<0.4	7	10	23	<0.1	3	30	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH4	3.2-3.45	Silty clay	<4	<0.4	5	<1	14	<0.1	<1	1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH5	0-0.1	Fill: sandy silt	<4	<0.4	6	6	15	<0.1	2	27	3.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	100	100	<0.2	<0.5	<1	<1	Not Detected
BH5	3.2-3.45	Silty clay	6	<0.4	14	11	19	<0.1	2	10	<0.05	<0.05	<0.1	<0.1	<0.1	0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH101	0.0-0.2	Fill: silty clay	8	0.6	16	23	41	0.2	8	94	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH101	0.7-0.95	Silty clay	8	<0.4	13	31	27	0.8	3	9	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH102	0.0-0.2	Fill: silty sand	<4	<0.4	8	17	100	<0.1	3	140	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH102	0.7-0.95	Silty clay	7	<0.4	14	14	18	<0.1	1	7	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH103	0.0-0.2	Fill: silty sand	6	<0.4	20	18	30	<0.1	16	38	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	100	100	<0.2	<0.5	<1	<1	Not Detected
BH103	1.1-1.3	Silty clay	16	<0.4	19	12	17	0.2	2	6	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH104	0.05-0.1	Fill:silty clay	6	<0.4	14	4	19	<0.1	1	6	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH104	1.8-1.95	Silty sandy clay	6	<0.4	14	5	11	<0.1	2	7	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH105	0.0-0.1	Fill:silty clay	5	<0.4	12	7	20	<0.1	2	12	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH105	1.1-1.4	Silty clay	8	<0.4	8	5	19	<0.1	<1	4	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH106	0.0-0.2	Fill: silty sand	<4	<0.4	7	10	17	<0.1	3	32	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH106	0.6-0.8	Sandstone	8	<0.4	8	10	11	<0.1	2	12	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH107	0.7-0.95	Fill: silty clay	6	<0.4	13	4	21	<0.1	2	13	<0.05	<0.05	<0.1	<0.1	<0.1	0.2	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH107	1.8-1.95	Sandy clay	<4	<0.4	11	<1	17	<0.1	<1	<1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH108	0.0-0.2	Fill: silty sand	<4	<0.4	9	11	24	<0.1	3	36	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH108	4.2-4.5	Silty clay	8	<0.4	21	5	10	0.2	<1	4	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH109	1.6-1.95	Fill: silty clay	5	<0.4	21	3	16	<0.1	5	23	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH109	3.8-4.0	Sandy clay	4	<0.4	17	3	11	<0.1	1	3	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH110	0.5-0.7	Fill: silty clay	7	<0.4	12	5	24	<0.1	2	25	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH110	1.6-1.95	Silty clay	20	<0.4	7	16	13	<0.1	1	3	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH111	0.7-0.95	Fill: silty clay	7	<0.4	19	4	79	0.2	2	27	0.2	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH111	3.3-3.45	Silty clay	5	<0.4	20	2	10	<0.1	1	5	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH112	0.7-0.95	Fill: silty clay	19	<0.4	14	7	11	<0.1	1	6	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	Not Detected
BH112	1.4-1.5	Silty clay	6	<0.4	20	5	15	<0.1	<1	2	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
BH113	0.0-0.2	Fill: silty sand	5	<0.4	9	12	25	<0.1	3	32	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<25	<50	<100	130	130	<0.2	<0.5	<1	<1	Not Detected
BH113	1.1-1.2	Siltstone	4	<0.4	4	7	17	<0.1	<1	1	<0.05	<0.05	NA	NA	NA	NA	NA	<25	<50	<100	<100	<PQL	<0.2	<0.5	<1	<1	NA
Total Number of samples			36	36	36	36	36	36	36	36	36	36	23	23	23	23	23	36	36	36	36	36	36	36	36	36	18
Maximum Value			20	0.6	21	40	100	0.8	16	140	3.1	0.3	<PQL	<PQL	<PQL	0.2	<PQL	<PQL	<PQL	<PQL	130	130	<PQL	<PQL	<PQL	<PQL	NC

Concentration above the CT1 — VALUE
Concentration above SCC1 — VALUE
Concentration above the SCC2 — VALUE

TABLE E

SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO HUMAN CONTACT GILs

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZECC 2000 Recreational	NHMRC ADWG 2011	SAMPLES	
				MW102	MW111
Inorganic Compounds and Parameters					
pH	0.1	6.5 - 8.5	6.5 - 8.5	5.9	5
Electrical Conductivity (µS/cm)	1	NSL	NSL	1200	520
Metals and Metalloids					
Arsenic (As lll)	1	50	10	<1	2
Cadmium	0.1	5	2	0.2	<0.1
Chromium (total)	1	50	50	<1	<1
Copper	1	1000	2000	<1	<1
Lead	1	50	10	<1	<1
Total Mercury (inorganic)	0.05	1	1	<0.05	<0.05
Nickel	1	100	20	14	4
Zinc	1	5000	3000	71	24
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)					
Benzene	1	10	1	<1	<1
Toluene	1	NSL	800	<1	<1
Ethylbenzene	1	NSL	300	<1	<1
m+p-xylene	2	NSL	NSL	<2	<2
o-xylene	1	NSL	NSL	<1	<1
Total xylenes	2	NSL	600	<2	<2
Volatile Organic Compounds (VOCs), including chlorinated VOCs					
Dichlorodifluoromethane	10	NSL	NSL	<10	<10
Chloromethane	10	NSL	NSL	<10	<10
Vinyl Chloride	10	NSL	0.3	<10	<10
Bromomethane	10	NSL	NSL	<10	<10
Chloroethane	10	NSL	NSL	<10	<10
Trichlorofluoromethane	10	NSL	NSL	<10	<10
1,1-Dichloroethene	**1**	0.3	30	<1	<1
Trans-1,2-dichloroethene	1	NSL	NSL	<1	<1
1,1-dichloroethane	1	NSL	NSL	<1	<1
Cis-1,2-dichloroethene	1	NSL	NSL	<1	<1
Bromochloromethane	1	NSL	250	<1	<1
Chloroform	1	NSL		1	<1
2,2-dichloropropane	1	NSL	NSL	<1	<1
1,2-dichloroethane	1	10	3	<1	<1
1,1,1-trichloroethane	1	NSL	NSL	<1	<1
1,1-dichloropropene	1	NSL	NSL	<1	<1
Cyclohexane	1	NSL	NSL	<1	<1
Carbon tetrachloride	1	3	NSL	<1	<1
Benzene	1	NSL	see BTEX	<1	<1
Dibromomethane	1	NSL	NSL	<1	<1
1,2-dichloropropane	1	NSL	NSL	<1	<1
Trichloroethene	1	30	NSL	<1	<1
Bromodichloromethane	1	NSL	NSL	<1	<1
trans-1,3-dichloropropene	1	NSL	NSL	<1	<1
cis-1,3-dichloropropene	1	NSL	NSL	<1	<1
1,1,2-trichloroethane	1	NSL	NSL	<1	<1
Toluene	1	NSL	see BTEX	<1	<1
1,3-dichloropropane	1	NSL	NSL	<1	<1
Dibromochloromethane	1	NSL	NSL	<1	<1
1,2-dibromoethane	1	NSL	NSL	<1	<1
Tetrachloroethene	1	10	NSL	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	NSL	<1	<1
Chlorobenzene	1	NSL	300	<1	<1
Ethylbenzene	1	NSL	see BTEX	<1	<1
Bromoform	1	NSL	NSL	<1	<1
m+p-xylene	2	NSL	see BTEX	<1	<1
Styrene	1	NSL	NSL	<1	<1
1,1,2,2-tetrachloroethane	1	NSL	NSL	<1	<1
o-xylene	1	NSL	see BTEX	<1	<1
1,2,3-trichloropropane	1	NSL	NSL	<1	<1
Isopropylbenzene	1	NSL	NSL	<1	<1
Bromobenzene	1	NSL	NSL	<1	<1
n-propyl benzene	1	NSL	NSL	<1	<1
2-chlorotoluene	1	NSL	NSL	<1	<1
4-chlorotoluene	1	NSL	NSL	<1	<1
1,3,5-trimethyl benzene	1	NSL	NSL	<1	<1
Tert-butyl benzene	1	NSL	NSL	<1	<1
1,2,4-trimethyl benzene	1	NSL	NSL	<1	<1
1,3-dichlorobenzene	1	NSL	300	<1	<1
Sec-butyl benzene	1	NSL	NSL	<1	<1
1,4-dichlorobenzene	1	NSL	40	<1	<1
4-isopropyl toluene	1	NSL	NSL	<1	<1
1,2-dichlorobenzene	1	NSL	1500	<1	<1
n-butyl benzene	1	NSL	NSL	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	NSL	<1	<1
1,2,4-trichlorobenzene	1	NSL	NSL	<1	<1
Hexachlorobutadiene	1	NSL	NSL	<1	<1
1,2,3-trichlorobenzene	1	NSL	NSL	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	0.2	NSL	NSL	<0.2	<0.2
Acenaphthylene	0.1	NSL	NSL	<0.1	<0.1
Acenaphthene	0.1	NSL	NSL	<0.1	<0.1
Fluorene	0.1	NSL	NSL	<0.1	<0.1
Phenanthrene	0.1	NSL	NSL	<0.1	<0.1
Anthracene	0.1	NSL	NSL	<0.1	<0.1
Fluoranthene	0.1	NSL	NSL	<0.1	<0.1
Pyrene	0.1	NSL	NSL	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	NSL	<0.1	<0.1
Chrysene	0.1	NSL	NSL	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	NSL	<0.2	<0.2
Benzo(a)pyrene	**0.1**	0.01	0.01	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	NSL	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	NSL	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	NSL	<0.1	<0.1

Concentration above the GIL — VALUE
PQL exceeds GIL — **BOLD/RED**

TABLE F

SUMMARY OF GROUNDAWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL GILs SAC

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	ANZECC 2000 Fresh Waters	SAMPLES	
			MW102	MW111
Inorganic Compounds and Parameters				
pH	0.1	6.5 - 8.5	5.9	5
Electrical Conductivity (µS/cm)	1	NSL	1200	520
Metals and Metalloids				
Arsenic (As III)	1	24	<1	2
Cadmium	0.1	0.2	0.2	<0.1
Chromium (VI)	1	1	<1	<1
Copper	1	1.4	<1	<1
Lead	1	3.4	<1	<1
Total Mercury (inorganic)	0.05	0.06	<0.05	<0.05
Nickel	1	11	14	4
Zinc	1	8	71	24
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)				
Benzene	1	950	<1	<1
Toluene	1	180	<1	<1
Ethylbenzene	1	80	<1	<1
m+p-xylene	2	75	<2	<2
o-xylene	1	350	<1	<1
Total xylenes	2	NSL	<2	<2
Volatile Organic Compounds (VOCs), including chlorinated VOCs				
Dichlorodifluoromethane	10	NSL	<10	<10
Chloromethane	10	NSL	<10	<10
Vinyl Chloride	10	100	<10	<10
Bromomethane	10	NSL	<10	<10
Chloroethane	10	NSL	<10	<10
Trichlorofluoromethane	10	NSL	<10	<10
1,1-Dichloroethene	1	700	<1	<1
Trans-1,2-dichloroethene	1	NSL	<1	<1
1,1-dichloroethane	1	90	<1	<1
Cis-1,2-dichloroethene	1	NSL	<1	<1
Bromochloromethane	1	NSL	<1	<1
Chloroform	1	370	1	<1
2,2-dichloropropane	1	NSL	<1	<1
1,2-dichloroethane	1	1900	<1	<1
1,1,1-trichloroethane	1	270	<1	<1
1,1-dichloropropene	1	NSL	<1	<1
Cyclohexane	1	NSL	<1	<1
Carbon tetrachloride	1	240	<1	<1
Benzene	1	see BTEX	<1	<1
Dibromomethane	1	NSL	<1	<1
1,2-dichloropropane	1	900	<1	<1
Trichloroethene	1	NSL	<1	<1
Bromodichloromethane	1	NSL	<1	<1
trans-1,3-dichloropropene	1	NSL	<1	<1
cis-1,3-dichloropropene	1	NSL	<1	<1
1,1,2-trichloroethane	1	6500	<1	<1
Toluene	1	see BTEX	<1	<1
1,3-dichloropropane	1	1100	<1	<1
Dibromochloromethane	1	NSL	<1	<1
1,2-dibromoethane	1	NSL	<1	<1
Tetrachloroethene	1	70	<1	<1
1,1,1,2-tetrachloroethane	1	NSL	<1	<1
Chlorobenzene	1	55	<1	<1
Ethylbenzene	1	see BTEX	<1	<1
Bromoform	1	NSL	<1	<1
m+p-xylene	2	see BTEX	<1	<1
Styrene	1	NSL	<1	<1
1,1,2,2-tetrachloroethane	1	400	<1	<1
o-xylene	1	see BTEX	<1	<1
1,2,3-trichloropropane	1	NSL	<1	<1
Isopropylbenzene	1	30	<1	<1
Bromobenzene	1	NSL	<1	<1
n-propyl benzene	1	NSL	<1	<1
2-chlorotoluene	1	NSL	<1	<1
4-chlorotoluene	1	NSL	<1	<1
1,3,5-trimethyl benzene	1	NSL	<1	<1
Tert-butyl benzene	1	NSL	<1	<1
1,2,4-trimethyl benzene	1	NSL	<1	<1
1,3-dichlorobenzene	1	260	<1	<1
Sec-butyl benzene	1	NSL	<1	<1
1,4-dichlorobenzene	1	60	<1	<1
4-isopropyl toluene	1	NSL	<1	<1
1,2-dichlorobenzene	1	160	<1	<1
n-butyl benzene	1	NSL	<1	<1
1,2-dibromo-3-chloropropane	1	NSL	<1	<1
1,2,4-trichlorobenzene	1	85	<1	<1
Hexachlorobutadiene	1	NSL	<1	<1
1,2,3-trichlorobenzene	1	3	<1	<1
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	0.2	16	<0.2	<0.2
Acenaphthylene	0.1	NSL	<0.1	<0.1
Acenaphthene	0.1	NSL	<0.1	<0.1
Fluorene	0.1	NSL	<0.1	<0.1
Phenanthrene	0.1	0.6	<0.1	<0.1
Anthracene	**0.1**	0.01	<0.1	<0.1
Fluoranthene	0.1	1	<0.1	<0.1
Pyrene	0.1	NSL	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	<0.1	<0.1
Chrysene	0.1	NSL	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	<0.1	<0.1

Concentration above the GIL — VALUE
PQL exceeds GIL — **BOLD/RED**

TABLE G

GROUNDWATER LABORATORY RESULTS COMPARED TO SITE SPECIFIC HSLs - RISK ASSESSMENT

All results in µg/L unless stated otherwise.

	PQL Envirolab Services	NHMRC ADWG 2011	WHO 2008	USEPA RSL Tapwater 2017	SAMPLES	
					MW102	MW111
Total Recoverable Hydrocarbons (TRH)						
C_6-C_9 Aliphatics (assessed using F1)	10	NSL	15000	-	<10	<10
>C_9-C_{14} Aliphatics (assessed using F2)	50	NSL	100	-	<50	<50
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)						
Benzene	1	1	-	-	<1	<1
Toluene	1	800	-	-	<1	<1
Ethylbenzene	1	300	-	-	<1	<1
Total xylenes	2	600	-	-	<2	<2
Polycyclic Aromatic Hydrocarbons (PAHs)						
Naphthalene	0.2	-	-	6.1	<0.2	<0.2
Volatile Organic Compounds (VOCs), including chlorinated VOCs						
Vinyl Chloride	**10**	0.3	-	-	<10	<10
1,1-Dichloroethene	1	30	-	-	<1	<1
Chloroform	1	250	-	-	1	<1
Bromodichloromethane	1		-	-	<1	<1
1,2-dichloroethane	1	3	-	-	<1	<1
Chlorobenzene	1	300	-	-	<1	<1
1,3-dichlorobenzene	1	300	-	-	<1	<1
1,4-dichlorobenzene	1	40	-	-	<1	<1
1,2-dichlorobenzene	1	1500	-	-	<1	<1

Concentration above the HSL -SSA — VALUE

PQL exceeds GIL — **BOLD/RED**

TABLE H

SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH2 (0.0-0.1m)	Arsenic	4	4	4	4.0	0
Dup Ref = HWDUP1	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	10	11	10.5	10
Envirolab Report: 198692	Copper	1	11	12	11.5	9
	Lead	1	26	28	27.0	7
	Mercury	0.1	<0.1	<0.1	NC	NC
	Nickel	1	5	6	5.5	18
	Zinc	1	30	28	29.0	7
	Naphthalene	0.1	0.2	<0.1	0.1	120
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	<0.05	<0.05	NC	NC
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	Total OCPs	0.1	<0.1	<0.1	NC	NC
	Total OPPs	0.1	<0.1	<0.1	NC	NC
	Total PCBs	0.1	<0.1	<0.1	NC	NC
	TRH C_6-C_{10} (F1)	25	<25	<25	NC	NC
	TRH >C_{10}-C_{16} (F2)	50	<50	<50	NC	NC
	TRH >C_{16}-C_{34} (F3)	100	<100	<100	NC	NC
	TRH >C_{34}-C_{40} (F4)	100	<100	<100	NC	NC
	Benzene	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE I

SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH101 0.0-0.2	Arsenic	4	8	9	8.5	12
Dup Ref = JHDUP1	Cadmium	0.4	0.6	<0.4	0.4	100
	Chromium	1	16	16	16.0	0
Envirolab Report: 203551	Copper	1	23	23	23.0	0
	Lead	1	41	32	36.5	25
	Mercury	0.1	0.2	0.2	0.2	0
	Nickel	1	8	5	6.5	46
	Zinc	1	94	56	75.0	51
	Naphthalene	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	<0.05	<0.05	NC	NC
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	<100	<100	NC	NC
	TRH >C34-C40 (F4)	100	<100	<100	NC	NC
	Benzene	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE J
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH103 0.0-0.2	Arsenic	4	6	5	5.5	18
Dup Ref = JHDUP2	Cadmium	0.4	<0.4	<0.4	NC	NC
	Chromium	1	20	38	29.0	62
Envirolab Report: 203551	Copper	1	18	17	17.5	6
	Lead	1	30	26	28.0	14
	Mercury	0.1	<0.1	0.1	0.1	67
	Nickel	1	16	30	23.0	61
	Zinc	1	38	36	37.0	5
	Naphthalene	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	<0.05	<0.05	NC	NC
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	110	<100	80.0	75
	TRH >C34-C40 (F4)	100	<100	<100	NC	NC
	Benzene	0.2	<0.2	<0.2	NC	NC
	Toluene	0.5	<0.5	<0.5	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable
Results between 5 & 10 times PQL = RPD value <= 75% are acceptable
Results < 5 times PQL = RPD value <= 100% are acceptable
If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE K
SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	SGS PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH108 0.0-0.2	Arsenic	4	1	<4	<1	NC	NC
Dup Ref = JHDUP3	Cadmium	0.4	0.3	<0.4	<0.3	NC	NC
	Chromium	1	0.3	9	5.9	7.5	42
Envirolab Report: 203551	Copper	1	0.5	11	10	10.5	10
SGS Report: SE185307	Lead	1	1	24	23	23.5	4
	Mercury	0.1	0.05	<0.1	<0.05	NC	NC
	Nickel	1	0.5	3	1.9	2.5	45
	Zinc	1	2	36	28	32.0	25
	Naphthalene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthylene	0.1	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.05	0.1	<0.05	<0.1	NC	NC
	Indeno(123-cd)pyrene	0.1	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	25	25	<25	<25	NC	NC
	TRH >C10-C16 (F2)	50	25	<50	<25	NC	NC
	TRH >C16-C34 (F3)	100	90	<100	<90	NC	NC
	TRH >C34-C40 (F4)	100	120	<100	<120	NC	NC
	Benzene	0.2	0.1	<0.2	<0.1	NC	NC
	Toluene	0.5	0.1	<0.5	<0.1	NC	NC
	Ethylbenzene	1	0.1	<1	<0.1	NC	NC
	m+p-xylene	2	0.2	<2	<0.2	NC	NC
	o-xylene	1	0.1	<1	<0.1	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE L

GROUNDWATER INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in µg/L unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = MW111	Arsenic	1	2	2	2	0
Dup Ref = DUPAM1	Cadmium	0.1	<0.1	<0.1	NC	NC
	Chromium	1	<1	<1	NC	NC
Envirolab Report: 203825	Copper	1	<1	<1	NC	NC
	Lead	1	<1	<1	NC	NC
	Mercury	0.05	<0.05	<0.05	NC	NC
	Nickel	1	4	4	4	0
	Zinc	1	24	25	25	4
	Naphthalene	0.2	<0.2	<0.2	NC	NC
	Acenaphthylene	0.1	<0.1	<0.1	NC	NC
	Acenaphthene	0.1	<0.1	<0.1	NC	NC
	Fluorene	0.1	<0.1	<0.1	NC	NC
	Phenanthrene	0.1	<0.1	<0.1	NC	NC
	Anthracene	0.1	<0.1	<0.1	NC	NC
	Fluoranthene	0.1	<0.1	<0.1	NC	NC
	Pyrene	0.1	<0.1	<0.1	NC	NC
	Benzo(a)anthracene	0.1	<0.1	<0.1	NC	NC
	Chrysene	0.1	<0.1	<0.1	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	<0.2	<0.2	NC	NC
	Benzo(a)pyrene	0.1	<0.1	<0.1	NC	NC
	Indeno(123-cd)pyrene	0.1	<0.1	<0.1	NC	NC
	Dibenzo(ah)anthracene	0.1	<0.1	<0.1	NC	NC
	Benzo(ghi)perylene	0.1	<0.1	<0.1	NC	NC
	TRH C6-C10 (F1)	10	<10	<10	NC	NC
	TRH >C10-C16 (F2)	50	<50	<50	NC	NC
	TRH >C16-C34 (F3)	100	<100	<100	NC	NC
	TRH >C34-C40 (F4)	100	<100	<100	NC	NC
	Benzene	1	<1	<1	NC	NC
	Toluene	1	<1	<1	NC	NC
	Ethylbenzene	1	<1	<1	NC	NC
	m+p-xylene	2	<2	<2	NC	NC
	o-xylene	1	<1	<1	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

TABLE M

SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TB[S]	TB[S]	TS[S]	TS[W]
			16/08/2018	18/10/2018	18/10/2018	23/10/2018
	mg/kg	µg/L	mg/kg	mg/kg	% Recovery	% Recovery
Benzene	1	0.2	<0.2	<0.2	99	107
Toluene	1	0.5	<0.5	<0.5	100	108
Ethylbenzene	1	1	<1	<1	98	110
m+p-xylene	2	2	<2	<2	98	109
o-xylene	1	1	<1	<1	97	110

Explanation:

[W] Sample type (water)

[S] Sample type (sand)

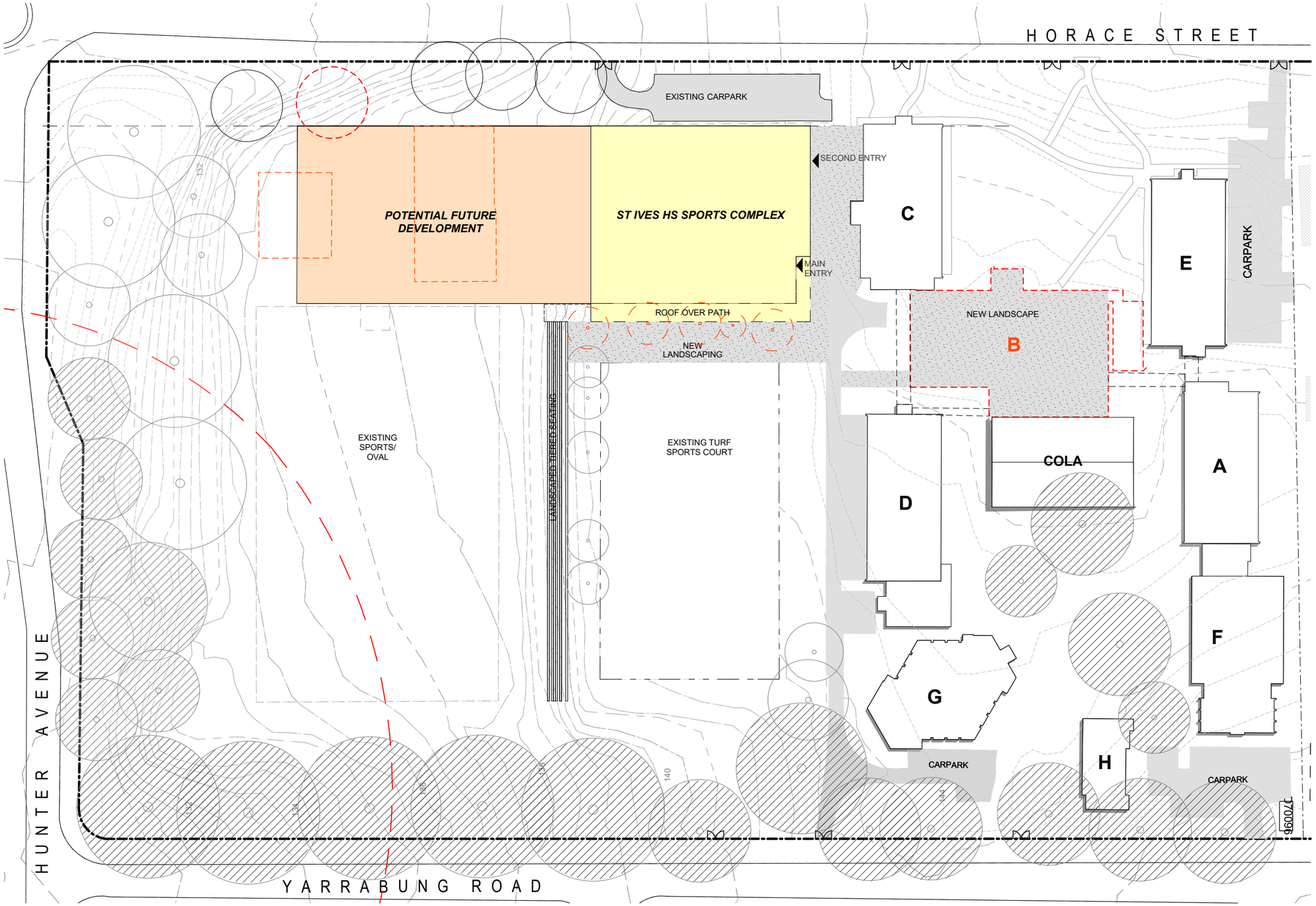
BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

Appendix A: Site Information

Proposed Development Plan

CD301_OPTION 3 - SITE PLAN



LEGEND

- EXISTING BUILDINGS
- EXISTING BUILDINGS TO BE REFURBISHED
- PROPOSED COUNCIL BUILDING
- PROPOSED ST. IVES HIGHSCHOOL BUILDING
- DEMOLISHED ELEMENTS
- BOUNDARY
- INTERNAL BOUNDARY
- D XXX DEMOUNTABLE
- NEW LANDSCAPE
- GATE ACCESS
- BUSH FIRE PRONE ZONE
- EXISTING LANDSCAPING
- BIO-DIVERSITY IDENTIFIED

KU-RING-GAI COUNCIL

ZONING :	SP2 INFRASTRUCTURE
HEIGHT LIMIT:	NONE
FSR :	NONE
SETBACK (E-SEPP):	MIN 5 m
PARKING:	1 SPACE EVERY 17 m²

OPTION 3 SCOPE

- REFURBISH BUILDING C
- DEMOLISH BUILDING B
- CONSTRUCT NEW ST IVES HALL
- AREA ALLOCATION FOR COUNCIL HALL

CONSTRAINTS

- SITE LEVELS REQUIRE FILL
- SYNTHETIC PLAY FIELD MAY NOT POSSIBLE DUE TO BUILDING SETBACKS

OPPORTUNITIES

- INCREASE PASSIVE SURVEILLANCE
- IMPROVED SITE CONNECTIVITY
- INCREASED SITE SECURITY
- INCREASED STREET PRESENCE
- DIREC CONNECTION TO PUBLIC HALL
- SCHOOL HAS SAFE, CLEAR CONNECTION TO SCHOOL FACILITIES WHILE HALL IS IN OPERATION
- OPPORTUNITY FOR BASEMENT LEVEL SHOULD COUNCIL REQUIRE IT

RISKS

- REMOVAL OF EXISTING TREES
- SITE CUT AND FILL REQUIRED
- SYNTHETIC PLAY FIELD NOT POSSIBLE DUE TO BUILDING SETBACKS

JDH architects

NSW GOVERNMENT Education

SCALE: 1:1000 @A3

ST. IVES HIGH SCHOOL

CONCEPT DESIGN P2
PRELIMINARY 7/08/2018

Appendix B: Borehole Logs

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 1
1/1

Client: JDH ARCHITECTS
Project: PROPOSED SPORTS COMPLEX
Location: ST IVES HIGH SCHOOL, ST IVES

Job No. 31754BC
Date: 16/8/18
Method: SPIRAL AUGER JK205
Logged/Checked by: C.A./D.B.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION						0			FILL: Sand, fine to coarse grained, brown.	D			
										M			
									FILL: Silty sand, fine to medium grained, dark brown, with bark material.	w<PL	Hd		RESIDUAL
					N = 29 5,12,17			CI	Silty CLAY: medium plasticity, light grey and orange brown, with root fibres.			>600 >600 >600	
						1		-	Extremely Weathered siltstone: silty CLAY, medium plasticity, light grey.	XW	Hd		ASHFIELD SHALE
									SILTSTONE: dark grey and red brown, with iron indurated bands.	DW	L		LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
						2		-	SANDSTONE: fine to medium grained, grey and red brown, with dark grey siltstone bands and iron indurated bands.		L-M		HAWKESBURY SANDSTONE MODERATE RESISTANCE WITH HIGH BANDS
						3					M		
									END OF BOREHOLE AT 3.7m				'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 2
1/1

Client: JDH ARCHITECTS
Project: PROPOSED SPORTS COMPLEX
Location: ST IVES HIGH SCHOOL, ST IVES

Job No. 31754BC
Date: 16/8/18
Method: SPIRAL AUGER JK205
Logged/Checked by: C.A./D.B.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION						0			FILL: Silty sand, fine to medium grained, dark brown, with root fibres.	M			GRASS COVER
									FILL: Silty clay, high plasticity grey and orange brown, with root fibres.	w≈PL		550	APPEARS MODERATELY COMPACTED
					N = 12 3,5,7			CH	Silty CLAY: high plasticity, grey and orange brown, with root fibres.	w≈PL		560 >600	RESIDUAL
						1			Silty CLAY: high plasticity, orange brown and light grey, with medium to coarse grained ironstone gravel.	w<PL	Hd		
					N > 24 8,11, 13/100mm							>600 >600 >600	
					REFUSAL	2		-	SILTSTONE: dark grey, with iron indurated bands.	DW	L-M		ASHFIELD SHALE LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
						3		-	SANDSTONE: fine to medium grained, light grey and orange brown, with iron indurated bands.		M		HAWKESBURY SANDSTONE MODERATE RESISTANCE
									END OF BOREHOLE AT 3.7m				HIGH RESISTANCE 'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 3
1/1

Client: JDH ARCHITECTS
Project: PROPOSED SPORTS COMPLEX
Location: ST IVES HIGH SCHOOL, ST IVES

Job No. 31754BC
Date: 16/8/18
Method: SPIRAL AUGER JK205
Logged/Checked by: C.A./D.B.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Sandy clay, low plasticity, dark brown, with root fibres and fine to medium grained sand.	w<PL			GRASS COVER
					N = 15 4,6,9			CH	FILL: Silty clay, medium plasticity, brown.	w>PL	Hd	500 580 >600	RESIDUAL
						1			Silty CLAY: high plasticity, orange brown and grey, trace of medium to coarse grained ironstone gravel.				
								-	SANDSTONE: fine to medium grained, orange and red brown, with iron indurated bands.	DW	L		HAWKESBURY SANDSTONE LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
						2							
									SANDSTONE: fine to medium grained, orange and red brown, with dark grey siltstone bands and iron indurated bands.		M		MODERATE RESISTANCE WITH HIGH BANDS
						3							
									SANDSTONE: fine to medium grained, light grey and orange brown.				
									END OF BOREHOLE AT 3.6m				'TC' BIT REFUSAL
						4							
						5							
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 4
1/1

Client: JDH ARCHITECTS
Project: PROPOSED SPORTS COMPLEX
Location: ST IVES HIGH SCHOOL, ST IVES

Job No. 31754BC
Date: 16/8/18
Method: SPIRAL AUGER JK205
Logged/Checked by: C.A./D.B.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION						0			FILL: Sandy clay, low plasticity, dark brown, fine to medium grained sand, with root fibres.	w<PL			GRASS COVER
										w≈PL			APPEARS MODERATELY COMPACTED
					N = 10 4,5,5				FILL: Silty clay, high plasticity, orange brown, light grey and brown.			450 400 500	
						1							
					N = 10 5,5,5				as above, but with trace of medium to coarse grained siltstone gravel.	w<PL		>600 >600 >600	
						2		CI	Silty CLAY: medium plasticity, light grey mottled red brown.	w≈PL	VSt		RESIDUAL
					N = 11 4,4,7	3						300 310 300	
						4		-	Extremely Weathered siltstone: silty CLAY, medium plasticity, light grey.	XW	Hd		HAWKESBURY SANDSTONE
▼ AFTER 1 HR								-	SANDSTONE: fine to coarse grained, light grey.	DW	L		VERY LOW 'TC' BIT RESISTANCE
								-	IRONSTONE BAND: 200mm.t		H		LOW RESISTANCE
						5		-	SANDSTONE: fine to coarse grained, light grey.		M-H		HIGH RESISTANCE MODERATE RESISTANCE
													HIGH RESISTANCE
									END OF BOREHOLE AT 5.6m				'TC' BIT REFUSAL
						6							
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 5
1/1

Client: JDH ARCHITECTS
Project: PROPOSED SPORTS COMPLEX
Location: ST IVES HIGH SCHOOL, ST IVES

Job No. 31754BC
Date: 16/8/18
Method: SPIRAL AUGER JK205
Logged/Checked by: C.A./D.B.
R.L. Surface: N/A
Datum:

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION	■			■	N = 13 4,6,7	0			FILL: Sandy clay, low plasticity, dark brown, with root fibres, fine to medium grained sand.	w<PL			GRASS COVER APPEARS MODERATELY TO WELL COMPACTED
									FILL: Silty clay, medium plasticity, brown, orange brown and light grey, trace of root fibres and medium to coarse grained ironstone gravel.				
	■			■	N = 23 9,14,9	1			FILL: Silty clay, medium plasticity, light grey and orange brown, trace of root fibres.				
						2							
	■			■	N = 20 5,9,11	3		CI	Silty CLAY: medium plasticity, grey and orange brown, with medium to coarse grained ironstone gravel.	w<PL	Hd	600 >600 >600	RESIDUAL
						4		-	IRONSTONE BAND: 900mm.t	DW	H		HAWKESBURY SANDSTONE HIGH 'TC' BIT RESISTANCE
				■		5		-	SANDSTONE: fine to coarse grained, light grey and orange brown.		M		MODERATE RESISTANCE
									END OF BOREHOLE AT 5.2m				'TC' BIT REFUSAL
						6							
						7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **101**

1/1

Environmental logs are not to be used for geotechnical purposes

JHDUP1 0.0-0.2

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT

Date: 17/10/2018

Method: SPIRAL AUGER
JK300

Logged/Checked by: J.H./T.H.

R.L. Surface: N/A

Datum:

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous and ironstone gravel, ash and root fibres.	w≈PL			GRASS COVER
	■		■			N = 10 4,4,6			-	Silty CLAY: medium to high plasticity, red brown, trace of ironstone gravel.	w≈PL			
	■		■				1		-	SILTSTONE: dark grey and red brown.				
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW102
1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, trace of root fibres.	M			GRASS COVER
									-		w≈PL			
	■		■			N = 9 3,4,5	1			Silty CLAY: medium to high plasticity, red brown, trace of ironstone gravel and root fibres.				
										as above, but light grey and orange brown.				
	■					N = 11 4,6,5	2		-	SILTSTONE: dark grey and red brown with iron indurated bands.				
	■						3		-	SANDSTONE: fine to medium grained, light yellow brown, with grey siltstone bands.				MODERATE RESISTANCE GROUNDWATER MOINTORING WELL INSTALLED TO 5.8m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 2.8m TO 5.8m. CASING 0.0m TO 2.8m TO SURFACE. 2mm SAND FILTER PACK 2.0m TO 5.8m. BENTONITE SEAL 0.0m TO 2.0m. BACKFIELD WITH SAND TO THE SURFACE. COMPLETED WITH CONCRETED GATIC COVER.
							4							
							5			SANDSTONE: fine to medium grained, grey.				
							6			END OF BOREHOLE AT 5.8m				REFUSAL ON BEDROCK
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **103**

1/1

Environmental logs are not to be used for geotechnical purposes

JHDUP2 0.0-0.2

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel, glass fragments, ash, slag and root fibres.	M			GRASS COVER
	■		■			N = 8 3,4,4				FILL: Silty clay, medium to high plasticity, red brown, trace of ironstone and igneous gravel, ash and root fibres.	w≈PL			
	■		■				1		-	Silty CLAY: medium to high plasticity, red brown, trace of root fibres.	w≈PL			
	■					N = 7 2,3,4								
									-	SILTSTONE: dark grey with iron indurated bands.				
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **104**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of root fibres.	M w≈PL			GRASS COVER
						N = 8 3,3,5				FILL: Silty clay, medium to high plasticity, red brown, trace of ash and root fibres.				
							1			as above, but with ironstone gravel.				
	■		■			N = 10 6,5,5			CI	Silty sandy CLAY: medium plasticity, orange brown and red, trace of ironstone gravel and fine grained sand.	w≈PL			
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **105**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty clay, medium to high plasticity, brown, trace of igneous gravel, ash and roots fibres.	m≈PL			GRASS COVER
						N > 6 11,6/ 150mm REFUSAL				FILL: IRONSTONE BOULDER				
	■		■				1		CI-CH	Silty CLAY: medium to high plasticity, red brown and light grey, trace of ironstone gravel.	w≈PL			
	■		■											
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **106**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 18/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres.	M			GRASS COVER
	■		■						-	SANDSTONE: fine to medium grained, red brown.				MODERATE TO HIGH STRENGTH
	■		■				1			as above, but grey and brown.				
										END OF BOREHOLE AT 1.5m				
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **107**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Clayey silt, low plasticity, brown, trace of root fibres.	w<PL			GRASS COVER
						N = 8 3,4,4				Fill: Silty clay, medium to high plasticity, grey, orange and brown, trace of igneous and ironstone gravel, ash and root fibres.	w≈PL			
	■		■				1							
									-	Silty CLAY: medium to high plasticity, light orange and red brown.	w≈PL			
	■					N = 9 5,4,5			-	Sandy CLAY: low to medium plasticity, grey and red brown, with fine grained sand.	w<PL			
	■						2			Sandy CLAY: low to medium plasticity, grey, with fine grained sand.				
							3			END OF BOREHOLE AT 3.0m				
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **108**

1/1

Environmental logs are not to be used for geotechnical purposes

JHDUP3 0.0-0.2

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 18/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■				0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres.	M			GRASS COVER
										FILL: Silty clay, medium to high plasticity, brown, trace of igneous and ironstone gravel, ash and root fibres.	w≈PL			
	■		■			N = 4 2,2,2	1							
										FILL: Silty clay, low to medium plasticity, brown with fine grained sand, trace of igneous and ironstone gravel and ash.				
	■		■			N = 5 2,2,3				FILL: Silty clay, medium to high plasticity, grey, red and brown, trace of igneous and ironstone gravel and ash.				
							2							
										FILL: Silty clay, medium to high plasticity, orange brown, with fine to medium grained sand, trace of igneous and ironstone gravel and ash.				
	■		■			N > 3 3,3/ 100mm	3							
▶						REFUSAL			-	Silty CLAY: medium to high plasticity, orange brown, trace of ironstone gravel.	w>PL			
										Silty CLAY: medium to high plasticity, orange brown, trace of ironstone gravel.	w>PL			HIGH RESISTANCE
	■						4			Silty CLAY: medium plasticity, grey and red brown, with fine grained sand, trace of ironstone gravel.				
										END OF BOREHOLE AT 4.5m				
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **109**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 18/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, brown, trace of igneous gravel and root fibres.	M w≈PL			GRASS COVER
	■		■			N = 4 3,2,2	1			Fill: Silty clay, medium to high plasticity, brown and red brown, trace of igneous and ironstone gravel and ash.				
	■		■			N = 5 3,2,3	2			FILL: Silty clay, medium to high plasticity, grey and red brown, trace of igneous and ironstone gravel and ash.	w≈PL			
	■		■				3			as above, but brown.				
	■		■			N = 11 3,5,6				FILL: Silty clay, medium to high plasticity, grey and orange brown, trace of ash.	w≈PL w<PL			
	■		■				4		-	Sandy CLAY: low to medium plasticity, yellow brown, with fine grained sand.				'TC' BIT RESISTANCE
							5			Sandy CLAY: low to medium plasticity, orange and grey, with fine grained sand. END OF BOREHOLE AT 4.5m				
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **110**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■				0			FILL: Clayey silt, low plasticity, brown, trace of sand and root fibres.	w>PL			GRASS COVER
	■		■			N = 7 3,3,4				FILL: Silty clay, medium to high plasticity, brown trace of igneous and ironstone gravel, ash and root fibres.				
▼	■		■				1			FILL: Silty clay, medium to high plasticity, orange brown and grey, trace of ironstone gravel and ash.				
▶									-	Silty CLAY: medium to high plasticity, orange brown and grey, trace of ironstone gravel.	w>PL			
	■		■			N = 5 1,2,3								
							2			END OF BOREHOLE AT 1.95m				
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No.
MW111
1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:**

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, brown, trace of root fibres.	M			GRASS COVER
	■		■			N = 2 1,1,1,				FILL: Silty clay, medium to high plasticity, red brown, trace of igneous and ironstone gravel and ash.	M>PL			GROUNDWATER MOINTORING WELL INSTALLED TO 6.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 3.7m TO 6.7m. CASING 0.0m TO 3.7m TO SURFACE. 2mm SAND FILTER PACK 3.0m TO 6.7m. BENTONITE SEAL 0.0m TO 3.0m. BACK FILLED WITH SAND TO THE SURFACE. COMPLETED WITH CONCRETED GATIC COVER.
							1			FILL: Silty clay, medium to high plasticity, light grey and orange brown, trace of ironstone gravel.	M>PL			
	■		■			N = 13 5,5,8				FILL: Silty clay, medium to high plasticity, brown and grey.	M≈PL			
	■		■				2			as above, but light grey, orange and red brown.				
	■		■			N = 10 3,5,5	3		-	Silty CLAY: medium to high plasticity, light brown.	M≈PL			
							4		-	SANDSTONE: fine to medium grained, light grey with bands of silty CLAY and sandy CLAY.				BANDED 'TC' BIT RESISTANCE
							5			SANDSTONE: fine to medium grained, red brown.				HIGH RESISTANCE
										as above, but light grey and red brown.				LOW RESISTANCE
							6			as above, but light grey.				MODERATE RESISTANCE
							7			END OF BOREHOLE AT 6.7m				

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **112**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 17/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty sand, fine to medium grained, dark brown, trace of igneous gravel and root fibres.	M			GRASS COVER
						N = 9 5,4,5				FILL: Silty clay, medium to high plasticity, red brown and grey, trace of igneous and ironstone gravel, root fibres, fine to medium grained sand and ash.	w≈PL			
	■		■				1							
	■		■			N = 9 6,5,4			-	Silty CLAY: medium to high plasticity, red brown, with fine to medium grained sand, trace of ironstone gravel.	w<PL			
	■						2			Silty CLAY: medium to high plasticity, light grey mottled red brown, trace of ironstone gravel.				
										END OF BOREHOLE AT 2.0m				
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **113**

1/1

Environmental logs are not to be used for geotechnical purposes

Client: JDH ARCHITECTS

Project: PROPOSED ALTERATIONS AND ADDITIONS

Location: ST IVES HIGH SCHOOL, ST IVES, NSW

Job No. E31754KT **Method:** SPIRAL AUGER JK300 **R.L. Surface:** N/A

Date: 18/10/2018 **Datum:**

Logged/Checked by: J.H./T.H.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPL-ETION	■		■				0			FILL: Silty Sand, fine to medium grained, brown, trace of root fibres.	D			GRASS COVER
										Fill: Silty clay, medium to high plasticity, brown, trace of ironstone gravel.	w≈PL			
	■		■			N = 12 4,7,5	1							
									-	SILTSTONE: light grey and red with iron indurated bands.				
	■					N = SPT 4/100mm REFUSAL				as above, but grey.				
										END OF BOREHOLE AT 1.6m				
							2							
							3							
							4							
							5							
							6							
							7							

ENVIRONMENTAL LOGS EXPLANATORY NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm 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 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

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

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

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

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it 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 and may not be the same at the time of construction.
- 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 be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

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SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_u = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_c = \frac{(D_{30})^2}{D_{10}\ D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

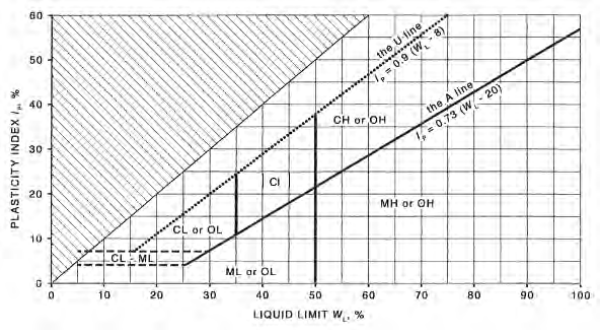
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record	▼	Standing water level. Time delay following completion of drilling/excavation may be shown.
	C	Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of undrained shear strength.
	PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.
	$w \approx$ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	$w \approx$ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL	VERY LOOSE – Density Index (I_D) Range (%): ≤ 15; SPT 'N' Value Range (Blows/300mm): 0 – 4
	L	LOOSE – Density Index (I_D) Range (%): > 15 and ≤ 35; SPT 'N' Value Range (Blows/300mm): 4 – 10
	MD	MEDIUM DENSE – Density Index (I_D) Range (%): > 35 and ≤ 65; SPT 'N' Value Range (Blows/300mm): 10 – 30
	D	DENSE – Density Index (I_D) Range (%): > 65 and ≤ 85; SPT 'N' Value Range (Blows/300mm): 30 – 50
	VD	VERY DENSE – Density Index (I_D) Range (%): > 85; SPT 'N' Value Range (Blows/300mm): > 50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.

Log Column	Symbol	Definition
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as:
		RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock.
		EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock.
		ALLUVIAL – soil deposited by creeks and rivers.
		ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents.
		MARINE – soil deposited in a marine environment.
		AEOLIAN – soil carried and deposited by wind.
		COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits.
		LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
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	Distinctly Weathered (Note 1)	HW	DW	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		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'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 weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix C: Laboratory Report/s & COC Documents

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CERTIFICATE OF ANALYSIS 198692

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31754KT, St Ives**
Number of Samples	24 SOIL
Date samples received	17/08/2018
Date completed instructions received	17/08/2018

Analysis Details

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

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

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

Report Details

Date results requested by	24/08/2018
Date of Issue	22/08/2018

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

Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Lucy Zhu, Asbsestos Analyst
Nancy Zhang, Assistant Lab Manager
Priya Samarawickrama, Senior Chemist
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	107	121	102	106	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	126	102	123	106	127

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		198692-22	198692-24
Your Reference	UNITS	HWDUP1	TB
Depth		-	-
Date Sampled		16/08/2018	16/08/2018
Type of sample		SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018
TRH C_6 - C_9	mg/kg	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
naphthalene	mg/kg	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	125	109

svTRH (C10-C40) in Soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	110	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	64
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	64
TRH >C_{16} -C_{34}	mg/kg	130	<100	<100	<100	110
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	130	<50	<50	<50	180
Surrogate o-Terphenyl	%	97	96	97	94	96

svTRH (C10-C40) in Soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	95	95	96	96	93

svTRH (C10-C40) in Soil		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date extracted	-	20/08/2018
Date analysed	-	21/08/2018
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	<100
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	<100
TRH >C_{34} -C_{40}	mg/kg	<100
Total +ve TRH (>C10-C40)	mg/kg	<50
Surrogate o-Terphenyl	%	93

PAHs in Soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Naphthalene	mg/kg	<0.1	<0.1	0.2	<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	0.2	<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	%	99	94	95	93	91

PAHs in Soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	0.6	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	0.4	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	0.3	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	0.2	<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	0.2	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	3.1	<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	%	94	96	94	96	94

PAHs in Soil		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date extracted	-	20/08/2018
Date analysed	-	21/08/2018
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	%	93

Organochlorine Pesticides in soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	93	93	94	91

Organochlorine Pesticides in soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Surrogate TCMX	%	94	94	94	103	99

Organochlorine Pesticides in soil		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date extracted	-	20/08/2018
Date analysed	-	21/08/2018
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	92

Organophosphorus Pesticides						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	93	93	94	91

Organophosphorus Pesticides						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	94	94	94	103	99

Organophosphorus Pesticides		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date extracted	-	20/08/2018
Date analysed	-	21/08/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	92

PCBs in Soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	98	93	93	94	91

PCBs in Soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date extracted	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	94	94	94	103	99

PCBs in Soil		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date extracted	-	20/08/2018
Date analysed	-	21/08/2018
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	92

Acid Extractable metals in soil						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Arsenic	mg/kg	9	<4	4	6	9
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	12	4	10	14	12
Copper	mg/kg	14	7	11	10	40
Lead	mg/kg	17	17	26	19	24
Mercury	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	7	<1	5	1	3
Zinc	mg/kg	29	4	30	3	19

Acid Extractable metals in soil						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Arsenic	mg/kg	10	<4	<4	<4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	7	5	6	14
Copper	mg/kg	11	10	<1	6	11
Lead	mg/kg	23	23	14	15	19
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	3	<1	2	2
Zinc	mg/kg	2	30	1	27	10

Acid Extractable metals in soil		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date prepared	-	20/08/2018
Date analysed	-	20/08/2018
Arsenic	mg/kg	4
Cadmium	mg/kg	<0.4
Chromium	mg/kg	11
Copper	mg/kg	12
Lead	mg/kg	28
Mercury	mg/kg	<0.1
Nickel	mg/kg	6
Zinc	mg/kg	28

Moisture						
Our Reference		198692-2	198692-3	198692-6	198692-8	198692-9
Your Reference	UNITS	BH1	BH1	BH2	BH2	BH3
Depth		0.1-0.2	0.6-0.95	0-0.1	1.5-1.6	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Moisture	%	13	11	12	17	15

Moisture						
Our Reference		198692-11	198692-12	198692-15	198692-16	198692-21
Your Reference	UNITS	BH3	BH4	BH4	BH5	BH5
Depth		0.6-0.95	0-0.1	3.2-3.45	0-0.1	3.2-3.45
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	21/08/2018	21/08/2018	21/08/2018	21/08/2018	21/08/2018
Moisture	%	15	8.1	15	7.1	9.0

Moisture		
Our Reference		198692-22
Your Reference	UNITS	HWDUP1
Depth		-
Date Sampled		16/08/2018
Type of sample		SOIL
Date prepared	-	20/08/2018
Date analysed	-	21/08/2018
Moisture	%	9.0

Asbestos ID - soils						
Our Reference		198692-2	198692-6	198692-9	198692-12	198692-16
Your Reference	UNITS	BH1	BH2	BH3	BH4	BH5
Depth		0.1-0.2	0-0.1	0-0.1	0-0.1	0-0.1
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date analysed	-	22/08/2018	22/08/2018	22/08/2018	22/08/2018	22/08/2018
Sample mass tested	g	Approx. 25g	Approx. 30g	Approx. 25g	Approx. 25g	Approx. 25g
Sample Description	-	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Soil Aggressivity					
Our Reference		198692-1	198692-4	198692-18	198692-20
Your Reference	UNITS	BH1	BH1	BH5	BH5
Depth		0-0.1	0.8-1.0	0.8-1.0	1.8-2.0
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL
pH 1:5 soil:water	pH Units	5.3	4.5	5.3	5.2
Resistivity by calculation	ohm m	51	93	200	270
Chloride, Cl 1:5 soil:water	mg/kg	160	52	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	<10	110	57	40

CEC			
Our Reference		198692-1	198692-18
Your Reference	UNITS	BH1	BH5
Depth		0-0.1	0.8-1.0
Date Sampled		16/08/2018	16/08/2018
Type of sample		SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018
Date analysed	-	20/08/2018	20/08/2018
Exchangeable Ca	meq/100g	8.9	5.0
Exchangeable K	meq/100g	0.5	0.2
Exchangeable Mg	meq/100g	3.1	0.76
Exchangeable Na	meq/100g	0.31	<0.1
Cation Exchange Capacity	meq/100g	13	6.0

Texture and Salinity*					
Our Reference		198692-1	198692-4	198692-18	198692-20
Your Reference	UNITS	BH1	BH1	BH5	BH5
Depth		0-0.1	0.8-1.0	0.8-1.0	1.8-2.0
Date Sampled		16/08/2018	16/08/2018	16/08/2018	16/08/2018
Type of sample		SOIL	SOIL	SOIL	SOIL
Date prepared	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Date analysed	-	20/08/2018	20/08/2018	20/08/2018	20/08/2018
Electrical Conductivity 1:5 soil:water	µS/cm	200	110	49	38
Texture Value	-	9.0	7.0	9.0	9.0
Texture		CLAY LOAM	MEDIUM CLAY	CLAY LOAM	CLAY LOAM
ECe	dS/m	<2	<2	<2	<2
Class		NON SALINE	NON SALINE	NON SALINE	NON SALINE

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Alternatively determined by colourimetry/turbidity using Discrete Analyer.
INORG-123	Determined using a "Texture by Feel" method.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.

Method ID	Methodology Summary
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			21/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	2	<25	<25	0	103	111
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	2	<25	<25	0	103	111
Benzene	mg/kg	0.2	Org-016	<0.2	2	<0.2	<0.2	0	87	97
Toluene	mg/kg	0.5	Org-016	<0.5	2	<0.5	<0.5	0	100	110
Ethylbenzene	mg/kg	1	Org-016	<1	2	<1	<1	0	106	112
m+p-xylene	mg/kg	2	Org-016	<2	2	<2	<2	0	112	117
o-Xylene	mg/kg	1	Org-016	<1	2	<1	<1	0	108	112
naphthalene	mg/kg	1	Org-014	<1	2	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	128	2	107	102	5	125	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]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	22	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	22	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	22	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	22	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	22	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	22	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	22	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	22	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	22	125	127	2	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			21/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	2	<50	<50	0	112	116
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	2	<100	<100	0	101	107
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	2	110	<100	10	90	71
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	2	<50	<50	0	112	116
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	2	130	110	17	101	107
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	2	<100	<100	0	90	71
Surrogate o-Terphenyl	%		Org-003	96	2	97	96	1	110	96

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	22	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	22	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	22	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	22	93	93	0	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			21/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			22/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	108	97
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	100	85
Phenanthrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	110	102
Anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	111	104
Pyrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	103	98
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	95	90
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	2	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	2	<0.05	<0.05	0	110	105
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	99	2	99	95	4	130	107

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	22	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	22	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	22	93	94	1	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			21/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
HCB	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	87	94
gamma-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	68	71
Heptachlor	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	69	71
delta-BHC	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	74	77
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	73	75
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	77	80
Dieldrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	79	82
Endrin	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	75	78
pp-DDD	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	75	77
Endosulfan II	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	60	67
Methoxychlor	mg/kg	0.1	Org-005	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	96	2	98	99	1	116	99

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	22	92	94	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			21/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	100	101
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	92	91
Dimethoate	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	114	111
Fenitrothion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	115	113
Malathion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	65	78
Parathion	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	105	102
Ronnel	mg/kg	0.1	Org-008	<0.1	2	<0.1	<0.1	0	116	115
Surrogate TCMX	%		Org-008	96	2	98	99	1	93	93

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	22	92	94	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date extracted	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			21/08/2018	2	21/08/2018	21/08/2018		21/08/2018	21/08/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	115	113
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	2	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	96	2	98	99	1	93	93

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	21/08/2018	21/08/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	22	92	94	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	198692-3
Date prepared	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Date analysed	-			20/08/2018	2	20/08/2018	20/08/2018		20/08/2018	20/08/2018
Arsenic	mg/kg	4	Metals-020	<4	2	9	10	11	117	94
Cadmium	mg/kg	0.4	Metals-020	<0.4	2	<0.4	<0.4	0	104	100
Chromium	mg/kg	1	Metals-020	<1	2	12	12	0	113	103
Copper	mg/kg	1	Metals-020	<1	2	14	11	24	115	109
Lead	mg/kg	1	Metals-020	<1	2	17	19	11	110	102
Mercury	mg/kg	0.1	Metals-021	<0.1	2	0.2	0.1	67	108	116
Nickel	mg/kg	1	Metals-020	<1	2	7	6	15	110	105
Zinc	mg/kg	1	Metals-020	<1	2	29	22	27	107	102

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Date analysed	-			[NT]	22	20/08/2018	20/08/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	22	4	4	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	22	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	22	11	11	0	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	22	12	11	9	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	22	28	26	7	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	22	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	22	6	6	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	22	28	28	0	[NT]	[NT]

QUALITY CONTROL: Soil Aggressivity						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Resistivity by calculation	ohm m	0.1	Inorg-002	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	93	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			20/08/2018	[NT]	[NT]	[NT]	[NT]	20/08/2018	[NT]
Date analysed	-			20/08/2018	[NT]	[NT]	[NT]	[NT]	20/08/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]

QUALITY CONTROL: Texture and Salinity*					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			20/08/2018	[NT]	[NT]	[NT]	[NT]	20/08/2018	[NT]
Date analysed	-			20/08/2018	[NT]	[NT]	[NT]	[NT]	20/08/2018	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor

Sample Login Details

Your reference	E31754KT, St Ives
Envirolab Reference	198692
Date Sample Received	17/08/2018
Date Instructions Received	17/08/2018
Date Results Expected to be Reported	24/08/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	24 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	7.1
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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Phone: 02 9910 6200	**Phone: 02 9910 6200**
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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 Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Soil Aggressivity	CEC	Texture and Salinity*	On Hold
BH1-0-0.1									✓	✓	✓	
BH1-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓				
BH1-0.6-0.95	✓	✓	✓	✓	✓	✓	✓					
BH1-0.8-1.0									✓		✓	
BH1-1.8-2.0												✓
BH2-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH2-0.6-0.95												✓
BH2-1.5-1.6	✓	✓	✓	✓	✓	✓	✓					
BH3-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH3-0.4-0.5												✓
BH3-0.6-0.95	✓	✓	✓	✓	✓	✓	✓					
BH4-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH4-0.7-0.95												✓
BH4-1.7-1.95												✓
BH4-3.2-3.45	✓	✓	✓	✓	✓	✓	✓					
BH5-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓				
BH5-0.7-0.95												✓
BH5-0.8-1.0									✓	✓	✓	
BH5-17-1.95												✓
BH5-1.8-2.0									✓		✓	
BH5-3.2-3.45	✓	✓	✓	✓	✓	✓	✓					
HWDUP1	✓	✓	✓	✓	✓	✓	✓					
HWDUP2												✓
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.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31754KT	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067	Date Results Required: STANDARD	MACQUARIE PARK, NSW 2113
P: (02) 99106200		P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201	Page: 1/1	Attention: Katrina Taylor
Attention: Aileen		

Location: St Ives

Sampler: HW

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos	CEC	Aggressivity	ECe (texture)
16/08/2018	1	BH1	0-0.1	G, A, P	0	F:GravSand										X	X	X
	2		0.1-0.2	G, A	0	F:SiHySand				X								
	3		0.6-0.95	G	51	SiHyCLAY			X									
	4		0.8-1.0	P	—	SiHyCLAY											X	X
	5	↓	1.8-2.0	P	—	SiltStone												
	6	BH2	0-0.1	G, A	3.8	F:SiHySand				X								
	7		0.6-0.95	G, A	0	F:SiHyCLAY												
	8	↓	1.5-1.6	G	1.7	SiHyCLAY			X									
	9	BH3	0-0.1	G, A	0.3	F:Sand/Silt				X								
	10		0.4-0.5	G, A	0	F:SiHyclay												
	11	↓	0.6-0.95	G,	0	SiHyCLAY			X									
	12	BH4	0-0.1	G, A	1.8	F:Sand/Silt				X								
	13		0.7-0.95	G, A	0	F:SiHyCLAY												
	14		1.7-1.95	G, A	0.2	F:SiHyCLAY												
	15	↓	3.2-3.45	G	0.7	SiHyCLAY			X									
	16	BH5	0-0.1	G, A, P	0.6	F:Sand/Silt				X								
	17		0.7-0.95	G, A	0	F:SiHyCLAY												
	18		0.8-1.0	P	—	F:SiHyCLAY										X	X	X
	19		1.7-1.95	G, A	0	F:SiHyCLAY												
	20		1.8-2.0	P	—	F:SiHyCLAY											X	X
	21	↓	3.2-3.45	G, A	0	F:SiHyCLAY		X										
	22	HWDUP1	—	G	—	Soil		X										
	23	HWDUP2	—	G	—	Soil												
↓	24	TB	—	G	—	Soil								X				

ENVIROLAB

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

Job No: 198692

Date Received: 17/8/18

Time Received: 14:05

Received by: LN

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):
Please test sulfate, choride, pH, EC & resistivity for Aggressivity.

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
HW	17/8/2018	11:20 am	ELS LN	17/8/18 14:05

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

CERTIFICATE OF ANALYSIS 203551

Client Details

Client	Environmental Investigation Services
Attention	Priya Dass
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31754KT, St Ives**
Number of Samples	63 Soil
Date samples received	19/10/2018
Date completed instructions received	19/10/2018

Analysis Details

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

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

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

Report Details

Date results requested by	26/10/2018
Date of Issue	26/10/2018

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

Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Lucy Zhu, Asbsestos Analyst
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		203551-1	203551-2	203551-4	203551-8	203551-10
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH103
Depth		0-0.2	0.7-0.95	0-0.2	0-0.2	1.1-1.3
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	98	103	97	96

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		203551-13	203551-16	203551-18	203551-19	203551-20
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		0.05-0.1	0-0.1	1.1-1.4	0-0.2	0.6-0.8
Date Sampled		17/10/2018	17/10/2018	17/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	103	106	101	103

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		203551-23	203551-25	203551-27	203551-33	203551-36
Your Reference	UNITS	BH107	BH107	BH108	BH108	BH109
Depth		0.7-0.95	1.8-1.95	0-0.2	4.2-4.5	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	104	108	106	104

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		203551-39	203551-42	203551-46	203551-50	203551-52
Your Reference	UNITS	BH109	BH110	BH111	BH111	BH112
Depth		3.8-4.0	0.5-0.7	0.7-0.95	3.3-3.45	0.7-0.95
Date Sampled		18/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	102	99	99	103	106

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		203551-53	203551-55	203551-58	203551-60	203551-61
Your Reference	UNITS	BH112	BH113	BH113	JHDUP1	JHDUP2
Depth		1.4-1.5	0-0.2	1.1-1.2	-	-
Date Sampled		17/10/2018	18/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	104	93	98	103

vTRH(C6-C10)/BTEXN in Soil			
Our Reference		203551-62	203551-63
Your Reference	UNITS	TB	TS
Depth		-	-
Date Sampled		18/10/2018	18/10/2018
Type of sample		Soil	Soil
Date extracted	-	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	[NA]
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	[NA]
Benzene	mg/kg	<0.2	99%
Toluene	mg/kg	<0.5	100%
Ethylbenzene	mg/kg	<1	98%
m+p-xylene	mg/kg	<2	98%
o-Xylene	mg/kg	<1	97%
naphthalene	mg/kg	<1	[NA]
Total +ve Xylenes	mg/kg	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	109	98

svTRH (C10-C40) in Soil						
Our Reference		203551-1	203551-2	203551-4	203551-8	203551-10
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH103
Depth		0-0.2	0.7-0.95	0-0.2	0-0.2	1.1-1.3
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	110	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	110	<50
Surrogate o-Terphenyl	%	100	99	105	101	99

svTRH (C10-C40) in Soil						
Our Reference		203551-13	203551-16	203551-18	203551-19	203551-20
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		0.05-0.1	0-0.1	1.1-1.4	0-0.2	0.6-0.8
Date Sampled		17/10/2018	17/10/2018	17/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	96	96	95	98	104

svTRH (C10-C40) in Soil						
Our Reference		203551-23	203551-25	203551-27	203551-33	203551-36
Your Reference	UNITS	BH107	BH107	BH108	BH108	BH109
Depth		0.7-0.95	1.8-1.95	0-0.2	4.2-4.5	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	98	93	99	93	95

svTRH (C10-C40) in Soil						
Our Reference		203551-39	203551-42	203551-46	203551-50	203551-52
Your Reference	UNITS	BH109	BH110	BH111	BH111	BH112
Depth		3.8-4.0	0.5-0.7	0.7-0.95	3.3-3.45	0.7-0.95
Date Sampled		18/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	93	93	93	94	93

svTRH (C10-C40) in Soil						
Our Reference		203551-53	203551-55	203551-58	203551-60	203551-61
Your Reference	UNITS	BH112	BH113	BH113	JHDUP1	JHDUP2
Depth		1.4-1.5	0-0.2	1.1-1.2	-	-
Date Sampled		17/10/2018	18/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	130	<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	170	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	170	<50	<50	<50
Surrogate o-Terphenyl	%	92	97	92	99	96

PAHs in Soil						
Our Reference		203551-1	203551-2	203551-4	203551-8	203551-10
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH103
Depth		0-0.2	0.7-0.95	0-0.2	0-0.2	1.1-1.3
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<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	%	130	100	114	96	113

PAHs in Soil						
Our Reference		203551-13	203551-16	203551-18	203551-19	203551-20
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		0.05-0.1	0-0.1	1.1-1.4	0-0.2	0.6-0.8
Date Sampled		17/10/2018	17/10/2018	17/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<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	%	119	107	100	105	94

PAHs in Soil						
Our Reference		203551-23	203551-25	203551-27	203551-33	203551-36
Your Reference	UNITS	BH107	BH107	BH108	BH108	BH109
Depth		0.7-0.95	1.8-1.95	0-0.2	4.2-4.5	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<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	%	100	101	101	100	103

PAHs in Soil						
Our Reference		203551-39	203551-42	203551-46	203551-50	203551-52
Your Reference	UNITS	BH109	BH110	BH111	BH111	BH112
Depth		3.8-4.0	0.5-0.7	0.7-0.95	3.3-3.45	0.7-0.95
Date Sampled		18/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<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	%	100	97	101	100	102

PAHs in Soil						
Our Reference		203551-53	203551-55	203551-58	203551-60	203551-61
Your Reference	UNITS	BH112	BH113	BH113	JHDUP1	JHDUP2
Depth		1.4-1.5	0-0.2	1.1-1.2	-	-
Date Sampled		17/10/2018	18/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<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	%	101	99	101	105	99

Organochlorine Pesticides in soil						
Our Reference		203551-1	203551-4	203551-8	203551-13	203551-16
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.2	0-0.2	0-0.2	0.05-0.1	0-0.1
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	112	113	108	106	107

Organochlorine Pesticides in soil						
Our Reference		203551-19	203551-23	203551-27	203551-36	203551-42
Your Reference	UNITS	BH106	BH107	BH108	BH109	BH110
Depth		0-0.2	0.7-0.95	0-0.2	1.6-1.95	0.5-0.7
Date Sampled		18/10/2018	17/10/2018	18/10/2018	18/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	0.2	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	104	107	106	102

Organochlorine Pesticides in soil				
Our Reference		203551-46	203551-52	203551-55
Your Reference	UNITS	BH111	BH112	BH113
Depth		0.7-0.95	0.7-0.95	0-0.2
Date Sampled		17/10/2018	17/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	104	101	107

Organophosphorus Pesticides						
Our Reference		203551-1	203551-4	203551-8	203551-13	203551-16
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.2	0-0.2	0-0.2	0.05-0.1	0-0.1
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	112	113	108	106	107

Organophosphorus Pesticides						
Our Reference		203551-19	203551-23	203551-27	203551-36	203551-42
Your Reference	UNITS	BH106	BH107	BH108	BH109	BH110
Depth		0-0.2	0.7-0.95	0-0.2	1.6-1.95	0.5-0.7
Date Sampled		18/10/2018	17/10/2018	18/10/2018	18/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	106	104	107	106	102

Organophosphorus Pesticides				
Our Reference		203551-46	203551-52	203551-55
Your Reference	UNITS	BH111	BH112	BH113
Depth		0.7-0.95	0.7-0.95	0-0.2
Date Sampled		17/10/2018	17/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	104	101	107

PCBs in Soil						
Our Reference		203551-1	203551-4	203551-8	203551-13	203551-16
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.2	0-0.2	0-0.2	0.05-0.1	0-0.1
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	112	113	108	106	107

PCBs in Soil						
Our Reference		203551-19	203551-23	203551-27	203551-36	203551-42
Your Reference	UNITS	BH106	BH107	BH108	BH109	BH110
Depth		0-0.2	0.7-0.95	0-0.2	1.6-1.95	0.5-0.7
Date Sampled		18/10/2018	17/10/2018	18/10/2018	18/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	106	104	107	106	102

PCBs in Soil				
Our Reference		203551-46	203551-52	203551-55
Your Reference	UNITS	BH111	BH112	BH113
Depth		0.7-0.95	0.7-0.95	0-0.2
Date Sampled		17/10/2018	17/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	104	101	107

Acid Extractable metals in soil						
Our Reference		203551-1	203551-2	203551-4	203551-8	203551-10
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH103
Depth		0-0.2	0.7-0.95	0-0.2	0-0.2	1.1-1.3
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Arsenic	mg/kg	8	8	<4	6	16
Cadmium	mg/kg	0.6	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	13	8	20	19
Copper	mg/kg	23	31	17	18	12
Lead	mg/kg	41	27	100	30	17
Mercury	mg/kg	0.2	0.8	<0.1	<0.1	0.2
Nickel	mg/kg	8	3	3	16	2
Zinc	mg/kg	94	9	140	38	6

Acid Extractable metals in soil						
Our Reference		203551-13	203551-16	203551-18	203551-19	203551-20
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		0.05-0.1	0-0.1	1.1-1.4	0-0.2	0.6-0.8
Date Sampled		17/10/2018	17/10/2018	17/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Arsenic	mg/kg	6	5	8	<4	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	12	8	7	8
Copper	mg/kg	4	7	5	10	10
Lead	mg/kg	19	20	19	17	11
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	1	2	<1	3	2
Zinc	mg/kg	6	12	4	32	12

Acid Extractable metals in soil						
Our Reference		203551-23	203551-25	203551-27	203551-33	203551-36
Your Reference	UNITS	BH107	BH107	BH108	BH108	BH109
Depth		0.7-0.95	1.8-1.95	0-0.2	4.2-4.5	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Arsenic	mg/kg	6	<4	<4	8	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	13	11	9	21	21
Copper	mg/kg	4	<1	11	5	3
Lead	mg/kg	21	17	24	10	16
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Nickel	mg/kg	2	<1	3	<1	5
Zinc	mg/kg	13	<1	36	4	23

Acid Extractable metals in soil						
Our Reference		203551-39	203551-42	203551-46	203551-50	203551-52
Your Reference	UNITS	BH109	BH110	BH111	BH111	BH112
Depth		3.8-4.0	0.5-0.7	0.7-0.95	3.3-3.45	0.7-0.95
Date Sampled		18/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Arsenic	mg/kg	4	7	7	5	19
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	17	12	19	20	14
Copper	mg/kg	3	5	4	2	7
Lead	mg/kg	11	24	79	10	11
Mercury	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	1	2	2	1	1
Zinc	mg/kg	3	25	27	5	6

Acid Extractable metals in soil						
Our Reference		203551-53	203551-55	203551-58	203551-60	203551-61
Your Reference	UNITS	BH112	BH113	BH113	JHDUP1	JHDUP2
Depth		1.4-1.5	0-0.2	1.1-1.2	-	-
Date Sampled		17/10/2018	18/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Arsenic	mg/kg	6	5	4	9	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	9	4	16	38
Copper	mg/kg	5	12	7	23	17
Lead	mg/kg	15	25	17	32	26
Mercury	mg/kg	<0.1	<0.1	<0.1	0.2	0.1
Nickel	mg/kg	<1	3	<1	5	30
Zinc	mg/kg	2	32	1	56	36

Moisture						
Our Reference		203551-1	203551-2	203551-4	203551-8	203551-10
Your Reference	UNITS	BH101	BH101	BH102	BH103	BH103
Depth		0-0.2	0.7-0.95	0-0.2	0-0.2	1.1-1.3
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Moisture	%	33	21	27	21	23

Moisture						
Our Reference		203551-13	203551-16	203551-18	203551-19	203551-20
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		0.05-0.1	0-0.1	1.1-1.4	0-0.2	0.6-0.8
Date Sampled		17/10/2018	17/10/2018	17/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Moisture	%	19	20	8.8	22	9.8

Moisture						
Our Reference		203551-23	203551-25	203551-27	203551-33	203551-36
Your Reference	UNITS	BH107	BH107	BH108	BH108	BH109
Depth		0.7-0.95	1.8-1.95	0-0.2	4.2-4.5	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Moisture	%	15	11	20	15	15

Moisture						
Our Reference		203551-39	203551-42	203551-46	203551-50	203551-52
Your Reference	UNITS	BH109	BH110	BH111	BH111	BH112
Depth		3.8-4.0	0.5-0.7	0.7-0.95	3.3-3.45	0.7-0.95
Date Sampled		18/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Moisture	%	16	18	21	18	11

Moisture						
Our Reference		203551-53	203551-55	203551-58	203551-60	203551-61
Your Reference	UNITS	BH112	BH113	BH113	JHDUP1	JHDUP2
Depth		1.4-1.5	0-0.2	1.1-1.2	-	-
Date Sampled		17/10/2018	18/10/2018	18/10/2018	18/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018	26/10/2018
Moisture	%	15	22	14	22	29

Asbestos ID - soils						
Our Reference		203551-1	203551-4	203551-8	203551-13	203551-16
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0-0.2	0-0.2	0-0.2	0.05-0.1	0-0.1
Date Sampled		17/10/2018	17/10/2018	17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Sample mass tested	g	Approx. 30g	Approx. 30g	Approx. 25g	Approx. 35g	Approx. 30g
Sample Description	-	Brown clayey soil & rocks	Brown fine-grained soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		203551-19	203551-23	203551-27	203551-36	203551-42
Your Reference	UNITS	BH106	BH107	BH108	BH109	BH110
Depth		0-0.2	0.7-0.95	0-0.2	1.6-1.95	0.5-0.7
Date Sampled		18/10/2018	17/10/2018	18/10/2018	18/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Sample mass tested	g	Approx. 45g	Approx. 45g	Approx. 15g	Approx. 65g	Approx. 40g
Sample Description	-	Brown sandy soil & rocks	Brown clayey soil & rocks	Brown sandy soil & rocks	Brown clayey soil & rocks	Brown clayey soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		203551-46	203551-52	203551-55
Your Reference	UNITS	BH111	BH112	BH113
Depth		0.7-0.95	0.7-0.95	0-0.2
Date Sampled		17/10/2018	17/10/2018	18/10/2018
Type of sample		Soil	Soil	Soil
Date analysed	-	25/10/2018	25/10/2018	25/10/2018
Sample mass tested	g	Approx. 20g	Approx. 45g	Approx. 30g
Sample Description	-	Brown clayey soil & rocks	Brown clayey soil & rocks	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.

Method ID	Methodology Summary
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			26/10/2018	1	26/10/2018	26/10/2018		26/10/2018	26/10/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	1	<25	<25	0	97	89
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	1	<25	<25	0	97	89
Benzene	mg/kg	0.2	Org-016	<0.2	1	<0.2	<0.2	0	104	95
Toluene	mg/kg	0.5	Org-016	<0.5	1	<0.5	<0.5	0	95	86
Ethylbenzene	mg/kg	1	Org-016	<1	1	<1	<1	0	96	89
m+p-xylene	mg/kg	2	Org-016	<2	1	<2	<2	0	94	87
o-Xylene	mg/kg	1	Org-016	<1	1	<1	<1	0	96	88
naphthalene	mg/kg	1	Org-014	<1	1	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	1	104	94	10	117	104

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]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	26/10/2018	26/10/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	27	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	27	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	27	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	27	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	27	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	27	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	27	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	27	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	27	108	101	7	[NT]	[NT]

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]	60	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	60	26/10/2018	26/10/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	60	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	60	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	60	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	60	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	60	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	60	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	60	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	60	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	60	98	107	9	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	26/10/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	1	<50	<50	0	101	106
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	1	<100	<100	0	109	117
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	1	<100	<100	0	115	115
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	1	<50	<50	0	101	106
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	1	<100	<100	0	109	117
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	1	<100	<100	0	115	115
Surrogate o-Terphenyl	%		Org-003	94	1	100	102	2	97	105

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	26/10/2018	26/10/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	27	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	27	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	27	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	27	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	27	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	27	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	27	99	99	0	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	60	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	60	26/10/2018	26/10/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	60	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	60	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	60	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	60	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	60	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	60	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	60	99	100	1	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			26/10/2018	1	26/10/2018	26/10/2018		26/10/2018	26/10/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	100	102
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	90	91
Phenanthrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	93	93
Anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	103	103
Pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	98	97
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	109	111
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	1	<0.05	<0.05	0	115	114
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	105	1	130	109	18	101	98

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	26/10/2018	26/10/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	27	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	27	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	27	101	117	15	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	60	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	60	26/10/2018	26/10/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	60	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	60	<0.05	<0.05	0	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	60	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	60	105	103	2	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
HCB	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	89	94
gamma-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	94	99
Heptachlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	87	92
delta-BHC	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	89	94
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	91	96
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	100	106
Dieldrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	94	99
Endrin	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	95	101
pp-DDD	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	118	107
Endosulfan II	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	97	103
Methoxychlor	mg/kg	0.1	Org-005	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	103	1	112	112	0	115	120

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	27	107	109	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	95	102
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	108	111
Dimethoate	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	102	111
Fenitrothion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	98	107
Malathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	78	76
Parathion	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	97	101
Ronnel	mg/kg	0.1	Org-008	<0.1	1	<0.1	<0.1	0	100	107
Surrogate TCMX	%		Org-008	103	1	112	112	0	102	113

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	27	107	109	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date extracted	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	104	102
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	103	1	112	112	0	102	113

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	27	25/10/2018	25/10/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	27	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	27	107	109	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	203551-4
Date prepared	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			26/10/2018	1	26/10/2018	26/10/2018		26/10/2018	26/10/2018
Arsenic	mg/kg	4	Metals-020	<4	1	8	10	22	112	101
Cadmium	mg/kg	0.4	Metals-020	<0.4	1	0.6	<0.4	40	104	100
Chromium	mg/kg	1	Metals-020	<1	1	16	16	0	110	102
Copper	mg/kg	1	Metals-020	<1	1	23	25	8	115	110
Lead	mg/kg	1	Metals-020	<1	1	41	33	22	109	100
Mercury	mg/kg	0.1	Metals-021	<0.1	1	0.2	0.2	0	118	117
Nickel	mg/kg	1	Metals-020	<1	1	8	5	46	103	100
Zinc	mg/kg	1	Metals-020	<1	1	94	61	43	107	93

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	203551-61
Date prepared	-			[NT]	27	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			[NT]	27	26/10/2018	26/10/2018		26/10/2018	26/10/2018
Arsenic	mg/kg	4	Metals-020	[NT]	27	<4	<4	0	114	97
Cadmium	mg/kg	0.4	Metals-020	[NT]	27	<0.4	<0.4	0	106	93
Chromium	mg/kg	1	Metals-020	[NT]	27	9	7	25	111	72
Copper	mg/kg	1	Metals-020	[NT]	27	11	10	10	119	115
Lead	mg/kg	1	Metals-020	[NT]	27	24	22	9	111	112
Mercury	mg/kg	0.1	Metals-021	[NT]	27	<0.1	<0.1	0	107	115
Nickel	mg/kg	1	Metals-020	[NT]	27	3	3	0	105	73
Zinc	mg/kg	1	Metals-020	[NT]	27	36	37	3	109	101

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	60	25/10/2018	25/10/2018		[NT]	[NT]
Date analysed	-			[NT]	60	26/10/2018	26/10/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	60	9	7	25	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	60	<0.4	0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	60	16	15	6	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	60	23	21	9	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	60	32	38	17	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	60	0.2	0.1	67	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	60	5	6	18	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	60	56	88	44	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Priya Dass

Sample Login Details

Your reference	E31754KT, St Ives
Envirolab Reference	203551
Date Sample Received	19/10/2018
Date Instructions Received	19/10/2018
Date Results Expected to be Reported	26/10/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	63 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	20.7
Cooling Method	None
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 Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	On Hold
BH101-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH101-0.7-0.95	✓	✓	✓				✓		
BH101-1.3-1.5									✓
BH102-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH102-0.7-0.95									✓
BH102-1.6-1.95									✓
BH102-2.5-2.7									✓
BH103-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH103-0.7-0.95									✓
BH103-1.1-1.3	✓	✓	✓				✓		
BH103-1.8-1.95									✓
BH104-0-0.05									✓
BH104-0.05-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH104-0.7-0.95									✓
BH104-1.8-1.95									✓
BH105-0-0.1	✓	✓	✓	✓	✓	✓	✓	✓	
BH105-0.8-0.95									✓
BH105-1.1-1.4	✓	✓	✓				✓		
BH106-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH106-0.6-0.8	✓	✓	✓				✓		
BH106-1.3-1.5									✓
BH107-0-0.2									✓
BH107-0.7-0.95	✓	✓	✓	✓	✓	✓	✓	✓	
BH107-1.3-1.5									✓
BH107-1.8-1.95	✓	✓	✓				✓		
BH107-2.6-3.0									✓
BH108-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH108-0.7-0.95									✓
BH108-1.2-1.4									✓
BH108-1.7-1.95									✓
BH108-2.8-3.0									✓
BH108-3.2-3.4									✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	On Hold
BH108-4.2-4.5	✓	✓	✓				✓		
BH109-0-0.2									✓
BH109-0.6-0.95									✓
BH109-1.6-1.95	✓	✓	✓	✓	✓	✓	✓	✓	
BH109-2.6-2.8									✓
BH109-3.2-3.4									✓
BH109-3.8-4.0	✓	✓	✓				✓		
BH109-4.4-4.5									✓
BH110-0-0.1									✓
BH110-0.5-0.7	✓	✓	✓	✓	✓	✓	✓	✓	
BH110-0.7-0.95									✓
BH110-1.6-1.95									✓
BH111-0-0.2									✓
BH111-0.7-0.95	✓	✓	✓	✓	✓	✓	✓	✓	
BH111-1.6-1.8									✓
BH111-1.8-1.95									✓
BH111-2.8-3.0									✓
BH111-3.3-3.45	✓	✓	✓				✓		
BH112-0-0.2									✓
BH112-0.7-0.95	✓	✓	✓	✓	✓	✓	✓	✓	
BH112-1.4-1.5	✓	✓	✓				✓		
BH112-1.8-1.95									✓
BH113-0-0.2	✓	✓	✓	✓	✓	✓	✓	✓	
BH113-0.4-0.5									✓
BH113-0.6-0.95									✓
BH113-1.1-1.2	✓	✓	✓				✓		
BH113-1.5-1.6									✓
JHDUP1	✓	✓	✓				✓		
JHDUP2	✓	✓	✓				✓		
TB	✓								
TS	✓								

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

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Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31754KT	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: Priya Dass
Attention: Aileen	Page: 1 of 3	

Location:	St Ives	Sample Preserved In Esky on Ice
Sampler:	JH	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
17/10/18	1	BH101	0-0.2	G,A	0	FILL				✓								
"	2	"	0.7-0.95	"	0.4	NATURAL		✓										
"	3	↓	1.3-1.5	"	0.1	↓												
"	4	BH102	0-0.2	"	0.1	FILL				✓								
"	5	"	0.7-0.95	↓	0.5	NATURAL												
"	6	"	1.6-1.95	G	0.2	"												
"	7	↓	2.5-2.7	G	0.1	↓												
"	8	BH103	0-0.2	G,A	0	FILL				✓								
"	9	"	0.7-0.95	"	0.1	↓												
"	10	"	1.1-1.3	↓	0.1	NATURAL		✓										
"	11	↓	1.8-1.95	G	0	↓												
"	12	BH104	0-0.05	G,A	0	FILL												
"	13	"	0.05-0.1	"	0	"				✓								
"	14	"	0.7-0.95	"	0.5	↓												
"	15	↓	1.8-1.95	"	0.1	NATURAL												
"	16	BH105	0-0.1	"	0	FILL				✓								
"	17	"	0.8-0.95	"	0.9	NATURAL												
↓	18	↓	1.1-1.4	"	0.1	↓		✓										
18/10/18	19	BH106	0-0.2	"	0	FILL				✓								
"	20	"	0.6-0.8	"	0	NATURAL		✓										
↓	21	↓	1.3-1.5	"	0.2	↓												
17/10/18	22	BH107	0-0.2	"	0	FILL												
"	23	"	0.7-0.95	"	0	↓				✓								
"	24	"	1.3-1.5	↓	0	NATURAL												
↓	25	↓	1.8-1.95	G	0	↓		✓										

Remarks (comments/detection limits required):	Sample Containers: G2-125ml glass jar G - 250mg Glass Jar A - Ziplock Asbestos Bag V - Vial P - Plastic Bag

Relinquished By: Priya Dass	Date: 19/10/18	Time:	Received By: ECS CLP AOT	Date: 19/10/18 15:00

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31754KT	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: Priya Dass
Attention: Aileen	Page: 2 of 3	

Location: St Ives

Sampler: JH

Sample Preserved In Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
17/10/18	26	BH107	2.6-3.0	G,A	∅	NATURAL												
18/10/18	27	BH108	0-0.2	|	0	FILL				✓								
|	28	|	0.7-0.95	|	0	|												
|	29	|	1.2-1.4	|	0	|												
|	30	|	1.7-1.95	|	0.5	|												
|	31	|	2.8-3.0	|	0.4	↓												
|	32	|	3.2-3.4	↓	1.1	NATURAL												
|	33	↓	4.2-4.5	G	0	↓		✓										
|	34	BH109	0-0.2	G,A	0	FILL												
|	35	|	0.6-0.95	|	0.4	|												
|	36	|	1.6-1.95	|	4.4	|				✓								
|	37	|	2.6-2.8	|	0.7	|												
|	38	|	3.2-3.4	|	1.6	↓												
|	39	|	3.8-4.0	|	0.8	NATURAL		✓										
↓	40	↓	4.4-4.5	|	1.5	↓												
17/10/18	41	BH110	0-0.1	|	0	FILL												
|	42	|	0.5-0.7	|	0	|				✓								
|	43	|	0.7-0.95	|	0	↓									=			
|	44	↓	1.6-1.95	|	0	NATURAL												
|	45	BH111	0-0.2	|	0	FILL												
|	46	|	0.7-0.95	|	0	|				✓								
|	47	|	1.6-1.8	|	0.3	|												
|	48	|	1.8-1.95	|	0.2	|												
|	49	|	2.8-3.0	|	0.6	↓												
↓	50	↓	3.3-3.45	↓	3.6	NATURAL		✓										

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar G2 = 125ml glass jar
A - Ziplock Asbestos Bag V - Vial
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
Priya Dass	19/10/18		ECS ERIN NOTT	19/10/18 15:00

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31754KT	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		
Attention: Aileen	Page: 3 of 3	Attention: Priya Dass

Location:	St Ives	Sample Preserved in Esky on Ice
Sampler:	JH	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
17/10/18	51	BH112	0-0.2	G,A	0	FILL												
"	52	"	0.7-0.95	"	0.5	"				✓								
"	53	"	1.4-1.5	"	0	NATURAL		✓										
"	54	"	1.8-1.95	G	0	"												
18/10/18	55	BH113	0-0.2	G,A	0	FILL				✓								
"	56	"	0.4-0.5	"	0	"												
"	57	"	0.6-0.95	"	0.2	"												
"	58	"	1.1-1.2	"	20.2	NATURAL		✓										
"	59	"	1.5-1.6	G	2.1	"												
—	60	JHDUP1	—	"	—	Soil		✓										
—	61	JHDUP2	—	"	—	Soil		✓										
—	~~AK~~	JHDUP3	—	"	—	Soil		✓					Send to SGS					
—	62	TB	—	G2	—	Sand								✓				
—	63	TS	—	✓	—									✓				

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar; A - Ziplock Asbestos Bag; P - Plastic Bag	G2 - 125ml Glass Jar; V - Vial

Relinquished By:	Date:	Time:	Received By:	Date:
Priya Doss	19/10/18		ELS COLY NOTT	19/10/18 15:00

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

CERTIFICATE OF ANALYSIS 203551-A

Client Details

Client	Environmental Investigation Services
Attention	Priya Dass
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31754KT, St Ives**
Number of Samples	63 Soil
Date samples received	19/10/2018
Date completed instructions received	30/10/2018

Analysis Details

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

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

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

Report Details

Date results requested by	06/11/2018
Date of Issue	06/11/2018

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

Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Nick Sarlamis, Inorganics Supervisor
Steven Luong, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		203551-A-5	203551-A-15	203551-A-44
Your Reference	UNITS	BH102	BH104	BH110
Depth		0.7-0.95	1.8-1.95	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	31/10/2018	31/10/2018	31/10/2018
Date analysed	-	01/11/2018	01/11/2018	01/11/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	90	84

svTRH (C10-C40) in Soil				
Our Reference		203551-A-5	203551-A-15	203551-A-44
Your Reference	UNITS	BH102	BH104	BH110
Depth		0.7-0.95	1.8-1.95	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	31/10/2018	31/10/2018	31/10/2018
Date analysed	-	01/11/2018	01/11/2018	01/11/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	83	79	80

PAHs in Soil				
Our Reference		203551-A-5	203551-A-15	203551-A-44
Your Reference	UNITS	BH102	BH104	BH110
Depth		0.7-0.95	1.8-1.95	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	31/10/2018	31/10/2018	31/10/2018
Date analysed	-	01/11/2018	01/11/2018	01/11/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	81	78	103

Acid Extractable metals in soil				
Our Reference		203551-A-5	203551-A-15	203551-A-44
Your Reference	UNITS	BH102	BH104	BH110
Depth		0.7-0.95	1.8-1.95	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	31/10/2018	31/10/2018	31/10/2018
Date analysed	-	31/10/2018	31/10/2018	31/10/2018
Arsenic	mg/kg	7	6	20
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	14	14	7
Copper	mg/kg	14	5	16
Lead	mg/kg	18	11	13
Mercury	mg/kg	<0.1	<0.1	<0.1
Nickel	mg/kg	1	2	1
Zinc	mg/kg	7	7	3

Moisture				
Our Reference		203551-A-5	203551-A-15	203551-A-44
Your Reference	UNITS	BH102	BH104	BH110
Depth		0.7-0.95	1.8-1.95	1.6-1.95
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	31/10/2018	31/10/2018	31/10/2018
Date analysed	-	01/11/2018	01/11/2018	01/11/2018
Moisture	%	18	12	17

Misc Inorg - Soil				
Our Reference		203551-A-2	203551-A-15	203551-A-50
Your Reference	UNITS	BH101	BH104	BH111
Depth		0.7-0.95	1.8-1.95	3.3-3.45
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	02/11/2018	02/11/2018	02/11/2018
Date analysed	-	02/11/2018	02/11/2018	02/11/2018
pH 1:5 soil:water	pH Units	4.9	4.6	5.8

Clay 50-120g				
Our Reference		203551-A-2	203551-A-15	203551-A-50
Your Reference	UNITS	BH101	BH104	BH111
Depth		0.7-0.95	1.8-1.95	3.3-3.45
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	06/11/2018	06/11/2018	06/11/2018
Date analysed	-	06/11/2018	06/11/2018	06/11/2018
Clay in soils <2µm	% (w/w)	40	24	43

CEC				
Our Reference		203551-A-2	203551-A-15	203551-A-50
Your Reference	UNITS	BH101	BH104	BH111
Depth		0.7-0.95	1.8-1.95	3.3-3.45
Date Sampled		17/10/2018	17/10/2018	17/10/2018
Type of sample		Soil	Soil	Soil
Date prepared	-	02/11/2018	02/11/2018	02/11/2018
Date analysed	-	02/11/2018	02/11/2018	02/11/2018
Exchangeable Ca	meq/100g	3.1	0.2	1.5
Exchangeable K	meq/100g	0.2	0.1	0.2
Exchangeable Mg	meq/100g	1.3	0.41	0.81
Exchangeable Na	meq/100g	<0.1	<0.1	0.11
Cation Exchange Capacity	meq/100g	4.6	<1	2.6

Method ID	Methodology Summary
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2µm reported.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.

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.
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-8	[NT]
Date extracted	-			31/10/2018	5	31/10/2018	31/10/2018		31/10/2018	[NT]
Date analysed	-			01/11/2018	5	01/11/2018	01/11/2018		01/11/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	5	<25	<25	0	89	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	5	<25	<25	0	89	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	5	<0.2	<0.2	0	85	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	5	<0.5	<0.5	0	88	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	5	<1	<1	0	91	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	5	<2	<2	0	91	[NT]
o-Xylene	mg/kg	1	Org-016	<1	5	<1	<1	0	92	[NT]
naphthalene	mg/kg	1	Org-014	<1	5	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	87	5	83	82	1	96	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			31/10/2018	5	31/10/2018	31/10/2018		31/10/2018	[NT]
Date analysed	-			01/11/2018	5	01/11/2018	01/11/2018		01/11/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	5	<50	<50	0	114	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	5	<100	<100	0	112	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	5	<100	<100	0	111	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	5	<50	<50	0	114	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	5	<100	<100	0	112	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	5	<100	<100	0	111	[NT]
Surrogate o-Terphenyl	%		Org-003	86	5	83	82	1	101	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			31/10/2018	5	31/10/2018	31/10/2018		31/10/2018	[NT]
Date analysed	-			01/11/2018	5	01/11/2018	01/11/2018		01/11/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	111	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	113	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	118	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	113	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	100	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	110	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	5	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	5	<0.05	<0.05	0	107	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	5	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	86	5	81	81	0	90	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			31/10/2018	5	31/10/2018	31/10/2018		31/10/2018	[NT]
Date analysed	-			31/10/2018	5	31/10/2018	31/10/2018		31/10/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	5	7	6	15	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	5	<0.4	<0.4	0	102	[NT]
Chromium	mg/kg	1	Metals-020	<1	5	14	13	7	106	[NT]
Copper	mg/kg	1	Metals-020	<1	5	14	12	15	111	[NT]
Lead	mg/kg	1	Metals-020	<1	5	18	18	0	103	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	5	<0.1	<0.1	0	115	[NT]
Nickel	mg/kg	1	Metals-020	<1	5	1	1	0	107	[NT]
Zinc	mg/kg	1	Metals-020	<1	5	7	5	33	102	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			02/11/2018	2	02/11/2018	02/11/2018		02/11/2018	[NT]
Date analysed	-			02/11/2018	2	02/11/2018	02/11/2018		02/11/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	2	4.9	4.9	0	102	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			02/11/2018	[NT]	[NT]	[NT]	[NT]	02/11/2018	[NT]
Date analysed	-			02/11/2018	[NT]	[NT]	[NT]	[NT]	02/11/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Envirolab Services Pty Ltd
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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

SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Priya Dass

Sample Login Details

Your reference	E31754KT, St Ives
Envirolab Reference	203551-A
Date Sample Received	19/10/2018
Date Instructions Received	30/10/2018
Date Results Expected to be Reported	06/11/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	63 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	20.7
Cooling Method	None
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	Acid Extractable metalsin soil	Misc Inorg - Soil	Clay 50-120g	CEC	On Hold
BH101-0-0.2								✓
BH101-0.7-0.95					✓	✓	✓	
BH101-1.3-1.5								✓
BH102-0-0.2								✓
BH102-0.7-0.95	✓	✓	✓	✓				
BH102-1.6-1.95								✓
BH102-2.5-2.7								✓
BH103-0-0.2								✓
BH103-0.7-0.95								✓
BH103-1.1-1.3								✓
BH103-1.8-1.95								✓
BH104-0-0.05								✓
BH104-0.05-0.1								✓
BH104-0.7-0.95								✓
BH104-1.8-1.95	✓	✓	✓	✓	✓	✓	✓	
BH105-0-0.1								✓
BH105-0.8-0.95								✓
BH105-1.1-1.4								✓
BH106-0-0.2								✓
BH106-0.6-0.8								✓
BH106-1.3-1.5								✓
BH107-0-0.2								✓
BH107-0.7-0.95								✓
BH107-1.3-1.5								✓
BH107-1.8-1.95								✓
BH107-2.6-3.0								✓
BH108-0-0.2								✓
BH108-0.7-0.95								✓
BH108-1.2-1.4								✓
BH108-1.7-1.95								✓
BH108-2.8-3.0								✓
BH108-3.2-3.4								✓

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Acid Extractable metalsin soil	Misc Inorg - Soil	Clay 50-120g	CEC	On Hold
BH108-4.2-4.5								✓
BH109-0-0.2								✓
BH109-0.6-0.95								✓
BH109-1.6-1.95								✓
BH109-2.6-2.8								✓
BH109-3.2-3.4								✓
BH109-3.8-4.0								✓
BH109-4.4-4.5								✓
BH110-0-0.1								✓
BH110-0.5-0.7								✓
BH110-0.7-0.95								✓
BH110-1.6-1.95	✓	✓	✓	✓				
BH111-0-0.2								✓
BH111-0.7-0.95								✓
BH111-1.6-1.8								✓
BH111-1.8-1.95								✓
BH111-2.8-3.0								✓
BH111-3.3-3.45					✓	✓	✓	
BH112-0-0.2								✓
BH112-0.7-0.95								✓
BH112-1.4-1.5								✓
BH112-1.8-1.95								✓
BH113-0-0.2								✓
BH113-0.4-0.5								✓
BH113-0.6-0.95								✓
BH113-1.1-1.2								✓
BH113-1.5-1.6								✓
JHDUP1								✓
JHDUP2								✓
TB								✓
TS								✓

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

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Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

Andrew Fitzsimons

From: Ken Nguyen
Sent: Tuesday, 30 October 2018 5:27 PM
To: Andrew Fitzsimons
Subject: FW: Results for Registration 203551 E31754KT, St Ives

ELS:203551-A
TAT: 5 days
Due: 6/11/18

Regards,

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

Great Science, Great Service.

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

From: Priya Dass <PDass@jkgroup.net.au>
Sent: Tuesday, 30 October 2018 5:27 PM
To: Ken Nguyen <KNguyen@envirolab.com.au>
Cc: Aileen Hie <AHie@envirolab.com.au>
Subject: RE: Results for Registration 203551 E31754KT, St Ives

Hi Ken,

Could I have the following analysis done for the following samples from this lab batch on a standard TAT:

Combo #3:
- BH102 0.7-0.95 - 5
- BH104 1.8-1.95 - 15
- BH110 1.6-1.95 - 44

pH, CEC & Clay Content
- BH101 0.7-0.95 - 2
- BH104 1.8-1.95 - 15
- BH111 3.3-3.45 - 50

Regards,

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Priya Dass	Manager	Huong Crawford
Client	Jeffery & Katauskas Pty Ltd	Laboratory	SGS Alexandria Environmental
Address	Rear 115 Wicks Road MACQUARIE PARK NSW 2113	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	(02) 9888 5000	Telephone	+61 2 8594 0400
Facsimile	(02) 9888 5004	Facsimile	+61 2 8594 0499
Email	pdass@jkgroup.net.au	Email	au.environmental.sydney@sgs.com
Project	**St Ives**	SGS Reference	**SE185307 R0**
Order Number	(Not specified)	Date Received	22 Oct 2018
Samples	1	Date Reported	29 Oct 2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemis

Dong Liang
Metals/Inorganics Team Leader

Ly Kim Ha
Organic Section Head

Teresa Nguyen
Organic Chemist

Parameter	Units	LOR	Sample Number: SE185307.001 Sample Matrix: Soil Sample Date: 18 Oct 2018 Sample Name: JHDUP3
VOC's in Soil Method: AN433 Tested: 25/10/2018			
Monocyclic Aromatic Hydrocarbons			
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Polycyclic VOCs			
Naphthalene	mg/kg	0.1	<0.1
Surrogates			
Dibromofluoromethane (Surrogate)	%	-	**70**
d4-1,2-dichloroethane (Surrogate)	%	-	**78**
d8-toluene (Surrogate)	%	-	**77**
Bromofluorobenzene (Surrogate)	%	-	**87**
Totals			
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Volatile Petroleum Hydrocarbons in Soil Method: AN433 Tested: 25/10/2018			
TRH C6-C10	mg/kg	25	<25
TRH C6-C9	mg/kg	20	<20
Surrogates			
Dibromofluoromethane (Surrogate)	%	-	**70**
d4-1,2-dichloroethane (Surrogate)	%	-	**78**
d8-toluene (Surrogate)	%	-	**77**
Bromofluorobenzene (Surrogate)	%	-	**87**

Parameter	Units	LOR	Sample Number: SE185307.001 Sample Matrix: Soil Sample Date: 18 Oct 2018 Sample Name: JHDUP3
Volatile Petroleum Hydrocarbons in Soil Method: AN433 Tested: 25/10/2018 (continued)			
VPH F Bands			
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25
TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403 Tested: 25/10/2018			
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210
TRH F Bands			
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 Tested: 25/10/2018			
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

Parameter	Units	LOR	Sample Number: SE185307.001 Sample Matrix: Soil Sample Date: 18 Oct 2018 Sample Name: JHDUP3
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 Tested: 25/10/2018 (continued)			
Surrogates			
d5-nitrobenzene (Surrogate)	%	-	**98**
2-fluorobiphenyl (Surrogate)	%	-	**100**
d14-p-terphenyl (Surrogate)	%	-	**100**
Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 25/10/2018			
Arsenic, As	mg/kg	1	<1
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	**5.9**
Copper, Cu	mg/kg	0.5	**10**
Nickel, Ni	mg/kg	0.5	**1.9**
Lead, Pb	mg/kg	1	**23**
Zinc, Zn	mg/kg	2	**28**
Mercury in Soil Method: AN312 Tested: 25/10/2018			
Mercury	mg/kg	0.05	<0.05
Moisture Content Method: AN002 Tested: 25/10/2018			
% Moisture	%w/w	0.5	**21**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Mercury in Soil **Method: ME-(AU)-[ENV]AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB159654	mg/kg	0.05	<0.05	0%	94%	90%

Moisture Content **Method: ME-(AU)-[ENV]AN002**

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture	LB159652	%w/w	0.5	0 - 4%

PAH (Polynuclear Aromatic Hydrocarbons) in Soil **Method: ME-(AU)-[ENV]AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene	LB159651	mg/kg	0.1	<0.1	0%	112%	108%
2-methylnaphthalene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
1-methylnaphthalene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Acenaphthylene	LB159651	mg/kg	0.1	<0.1	0%	109%	113%
Acenaphthene	LB159651	mg/kg	0.1	<0.1	0%	117%	109%
Fluorene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Phenanthrene	LB159651	mg/kg	0.1	<0.1	0%	118%	111%
Anthracene	LB159651	mg/kg	0.1	<0.1	0%	112%	109%
Fluoranthene	LB159651	mg/kg	0.1	<0.1	0%	107%	106%
Pyrene	LB159651	mg/kg	0.1	<0.1	0%	118%	114%
Benzo(a)anthracene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Chrysene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Benzo(b&j)fluoranthene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Benzo(k)fluoranthene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Benzo(a)pyrene	LB159651	mg/kg	0.1	<0.1	0%	112%	106%
Indeno(1,2,3-cd)pyrene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Dibenzo(ah)anthracene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Benzo(ghi)perylene	LB159651	mg/kg	0.1	<0.1	0%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=0	LB159651	TEQ (mg/kg)	0.2	<0.2	0%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR	LB159651	TEQ (mg/kg)	0.3	<0.3	0%	NA	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	LB159651	TEQ (mg/kg)	0.2	<0.2	0%	NA	NA
Total PAH (18)	LB159651	mg/kg	0.8	<0.8	0%	NA	NA
Total PAH (NEPM/WHO 16)	LB159651	mg/kg	0.8	<0.8			

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d5-nitrobenzene (Surrogate)	LB159651	%	-	100%	4%	96%	102%
2-fluorobiphenyl (Surrogate)	LB159651	%	-	108%	2%	102%	102%
d14-p-terphenyl (Surrogate)	LB159651	%	-	108%	2%	100%	106%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES **Method: ME-(AU)-[ENV]AN040/AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB159653	mg/kg	1	<1	8%	99%	94%
Cadmium, Cd	LB159653	mg/kg	0.3	<0.3	39%	101%	97%
Chromium, Cr	LB159653	mg/kg	0.3	<0.3	16%	99%	98%
Copper, Cu	LB159653	mg/kg	0.5	<0.5	14%	87%	94%
Nickel, Ni	LB159653	mg/kg	0.5	<0.5	14%	87%	93%
Lead, Pb	LB159653	mg/kg	1	<1	39%	85%	65%
Zinc, Zn	LB159653	mg/kg	2	<2.0	25%	94%	-4%

TRH (Total Recoverable Hydrocarbons) in Soil **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C10-C14	LB159651	mg/kg	20	<20	0%	75%	75%
TRH C15-C28	LB159651	mg/kg	45	<45	11%	75%	-330%
TRH C29-C36	LB159651	mg/kg	45	<45	0%	75%	-320%
TRH C37-C40	LB159651	mg/kg	100	<100	0%	NA	NA
TRH C10-C36 Total	LB159651	mg/kg	110	<110	0%	NA	NA
TRH C10-C40 Total (F bands)	LB159651	mg/kg	210	<210	0%	NA	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH >C10-C16	LB159651	mg/kg	25	<25	0%	80%	58%
TRH >C10-C16 - Naphthalene (F2)	LB159651	mg/kg	25	<25	0%	NA	NA
TRH >C16-C34 (F3)	LB159651	mg/kg	90	<90	0%	75%	-610%
TRH >C34-C40 (F4)	LB159651	mg/kg	120	<120	0%	80%	NA

VOC's in Soil **Method: ME-(AU)-[ENV]AN433**

Monocyclic Aromatic Hydrocarbons

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene	LB159650	mg/kg	0.1	<0.1	0%	110%	67%
Toluene	LB159650	mg/kg	0.1	<0.1	0%	92%	87%
Ethylbenzene	LB159650	mg/kg	0.1	<0.1	0%	69%	71%
m/p-xylene	LB159650	mg/kg	0.2	<0.2	0%	64%	81%
o-xylene	LB159650	mg/kg	0.1	<0.1	0%	83%	72%

Polycyclic VOCs

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene	LB159650	mg/kg	0.1	<0.1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dibromofluoromethane (Surrogate)	LB159650	%	-	102%	1%	104%	113%
d4-1,2-dichloroethane (Surrogate)	LB159650	%	-	83%	2 - 8%	81%	104%
d8-toluene (Surrogate)	LB159650	%	-	96%	1 - 2%	97%	107%
Bromofluorobenzene (Surrogate)	LB159650	%	-	96%	1 - 4%	98%	96%

Totals

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Xylenes	LB159650	mg/kg	0.3	<0.3	0%	NA	NA
Total BTEX	LB159650	mg/kg	0.6	<0.6	0%	NA	NA

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatile Petroleum Hydrocarbons in Soil **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB159650	mg/kg	25	<25	0%	94%	77%
TRH C6-C9	LB159650	mg/kg	20	<20	0%	93%	78%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dibromofluoromethane (Surrogate)	LB159650	%	-	102%	1%	104%	113%
d4-1,2-dichloroethane (Surrogate)	LB159650	%	-	83%	2 - 8%	81%	104%
d8-toluene (Surrogate)	LB159650	%	-	96%	1 - 2%	97%	107%
Bromofluorobenzene (Surrogate)	LB159650	%	-	96%	1 - 4%	98%	96%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB159650	mg/kg	0.1	<0.1	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB159650	mg/kg	25	<25	0%	97%	78%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Si) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	Carcinogenic PAHs may be expressed as Benzo(a)pyrene equivalents by applying the BaP toxicity equivalence factor (NEPM 1999, June 2013, B7). These can be reported as the individual PAHs and as a sum of carcinogenic PAHs. The sum is reported three ways, the first assuming all <LOR results are zero, the second assuming all < LOR results are half the LOR and the third assuming all <LOR results are the LOR.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE185307 R0

CLIENT DETAILS

Contact	Priya Dass
Client	Jeffery & Katauskas Pty Ltd
Address	Rear 115 Wicks Road MACQUARIE PARK NSW 2113
Telephone	(02) 9888 5000
Facsimile	(02) 9888 5004
Email	pdass@jkgroup.net.au
Project	**St Ives**
Order Number	(Not specified)
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE185307 R0**
Date Received	22 Oct 2018
Date Reported	29 Oct 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item
Matrix Spike	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	2 items
	TRH (Total Recoverable Hydrocarbons) in Soil	4 items

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Other Lab	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	22/10/2018	Type of documentation received	COC
Number of eskies/boxes received	1	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	5.2°C
Sufficient sample for analysis	Yes	Turnaround time requested	Standard

HOLDING TIME SUMMARY

SE185307 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159654	18 Oct 2018	22 Oct 2018	15 Nov 2018	25 Oct 2018	15 Nov 2018	29 Oct 2018

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159652	18 Oct 2018	22 Oct 2018	01 Nov 2018	25 Oct 2018	30 Oct 2018	29 Oct 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159651	18 Oct 2018	22 Oct 2018	01 Nov 2018	25 Oct 2018	04 Dec 2018	29 Oct 2018

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159653	18 Oct 2018	22 Oct 2018	16 Apr 2019	25 Oct 2018	16 Apr 2019	29 Oct 2018

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159651	18 Oct 2018	22 Oct 2018	01 Nov 2018	25 Oct 2018	04 Dec 2018	29 Oct 2018

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159650	18 Oct 2018	22 Oct 2018	01 Nov 2018	25 Oct 2018	04 Dec 2018	29 Oct 2018

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
JHDUP3	SE185307.001	LB159650	18 Oct 2018	22 Oct 2018	01 Nov 2018	25 Oct 2018	04 Dec 2018	29 Oct 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil — Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	JHDUP3	SE185307.001	%	70 - 130%	100
d14-p-terphenyl (Surrogate)	JHDUP3	SE185307.001	%	70 - 130%	100
d5-nitrobenzene (Surrogate)	JHDUP3	SE185307.001	%	70 - 130%	98

VOC's in Soil — Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	87
d4-1,2-dichloroethane (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	78
d8-toluene (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	77
Dibromofluoromethane (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	70

Volatile Petroleum Hydrocarbons in Soil — Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	87
d4-1,2-dichloroethane (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	78
d8-toluene (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	77
Dibromofluoromethane (Surrogate)	JHDUP3	SE185307.001	%	60 - 130%	70

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB159654.001	Mercury	mg/kg	0.05	<0.05

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB159651.001		Naphthalene	mg/kg	0.1	<0.1
		2-methylnaphthalene	mg/kg	0.1	<0.1
		1-methylnaphthalene	mg/kg	0.1	<0.1
		Acenaphthylene	mg/kg	0.1	<0.1
		Acenaphthene	mg/kg	0.1	<0.1
		Fluorene	mg/kg	0.1	<0.1
		Phenanthrene	mg/kg	0.1	<0.1
		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	100
		2-fluorobiphenyl (Surrogate)	%	-	108
		d14-p-terphenyl (Surrogate)	%	-	108

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB159653.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB159651.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB159650.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	102
		d4-1,2-dichloroethane (Surrogate)	%	-	83
		d8-toluene (Surrogate)	%	-	96
		Bromofluorobenzene (Surrogate)	%	-	96
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Sample Number		Parameter	Units	LOR	Result
LB159650.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	102
		d4-1,2-dichloroethane (Surrogate)	%	-	83
		d8-toluene (Surrogate)	%	-	96

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185303.001	LB159654.014	Mercury	mg/kg	0.05	<0.05	<0.05	192	0
SE185312.002	LB159654.021	Mercury	mg/kg	0.05	0.03353431750	0.0331144888	180	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185312.002	LB159652.021	% Moisture	%w/w	0.5	15.42991755004	.851485148	37	4
SE185426.002	LB159652.011	% Moisture	%w/w	0.5	13.79310344823	.7931034482	37	0

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185426.003	LB159651.023		Naphthalene	mg/kg	0.1	0	0	200	0
			2-methylnaphthalene	mg/kg	0.1	0	0	200	0
			1-methylnaphthalene	mg/kg	0.1	0.01	0.01	200	0
			Acenaphthylene	mg/kg	0.1	0	0	200	0
			Acenaphthene	mg/kg	0.1	0.01	0.01	200	0
			Fluorene	mg/kg	0.1	0.01	0.01	200	0
			Phenanthrene	mg/kg	0.1	0.04	0.05	200	0
			Anthracene	mg/kg	0.1	0.04	0	200	0
			Fluoranthene	mg/kg	0.1	0.01	0.01	200	0
			Pyrene	mg/kg	0.1	0.04	0.04	200	0
			Benzo(a)anthracene	mg/kg	0.1	0.08	0.08	155	0
			Chrysene	mg/kg	0.1	0.08	0.08	155	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.03	0.03	200	0
			Benzo(k)fluoranthene	mg/kg	0.1	0.03	0.03	200	0
			Benzo(a)pyrene	mg/kg	0.1	0.01	0.01	200	0
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.01	0.01	200	0
			Dibenzo(ah)anthracene	mg/kg	0.1	0	0	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0.04	0.04	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	0	0	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	0.242	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	0.121	0.121	175	0
			Total PAH (18)	mg/kg	0.8	0	0	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.48	0.5	30	4
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.51	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.53	0.54	30	2

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185312.002	LB159653.022	Arsenic, As	mg/kg	1	5.9410965418	6.435	46	8
		Cadmium, Cd	mg/kg	0.3	0.5095115157	0.345	100	39
		Chromium, Cr	mg/kg	0.3	11.488042665	9.83	35	16
		Copper, Cu	mg/kg	0.5	26.110061824	22.595	32	14
		Nickel, Ni	mg/kg	0.5	7.0466403967	6.11	38	14
		Lead, Pb	mg/kg	1	58.930294177	39.83	32	39 ②
		Zinc, Zn	mg/kg	2	96.711053740	75.5	32	25

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185426.003	LB159651.023		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	58	65	103	11
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	58	65	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	0	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185303.001	LB159650.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	3.6	50	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.9	50	2
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.4	50	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	4.4	50	1
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE185312.002	LB159650.021	Monocyclic	Benzene	mg/kg	0.1	0	0	200	0
		Aromatic	Toluene	mg/kg	0.1	0.01	0.01	200	0
			Ethylbenzene	mg/kg	0.1	0	0	200	0
			m/p-xylene	mg/kg	0.2	0	0	200	0
			o-xylene	mg/kg	0.1	0	0	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	3.58	50	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.98	4.58	50	8
			d8-toluene (Surrogate)	mg/kg	-	4.71	4.64	50	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.33	4.5	50	4
		Totals	Total Xylenes	mg/kg	0.3	0	0	200	0
			Total BTEX	mg/kg	0.6	0.01	0.01	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE185303.001	LB159650.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	3.6	30	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.8	4.9	30	2
			d8-toluene (Surrogate)	mg/kg	-	4.3	4.4	30	2
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.3	4.4	30	1
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE185312.002	LB159650.021		TRH C6-C10	mg/kg	25	1.21	1.08	200	0
			TRH C6-C9	mg/kg	20	1.05	0.94	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	3.58	30	1
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.98	4.58	30	8
			d8-toluene (Surrogate)	mg/kg	-	4.71	4.64	30	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.33	4.5	30	4
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	1.2	1.07	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159654.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	94

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159651.002		Naphthalene	mg/kg	0.1	4.5	4	60 - 140	112
		Acenaphthylene	mg/kg	0.1	4.3	4	60 - 140	109
		Acenaphthene	mg/kg	0.1	4.7	4	60 - 140	117
		Phenanthrene	mg/kg	0.1	4.7	4	60 - 140	118
		Anthracene	mg/kg	0.1	4.5	4	60 - 140	112
		Fluoranthene	mg/kg	0.1	4.3	4	60 - 140	107
		Pyrene	mg/kg	0.1	4.7	4	60 - 140	118
		Benzo(a)pyrene	mg/kg	0.1	4.5	4	60 - 140	112
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	96
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	102
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	100

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159653.002	Arsenic, As	mg/kg	1	330	336.32	79 - 120	99
	Cadmium, Cd	mg/kg	0.3	420	416.6	69 - 131	101
	Chromium, Cr	mg/kg	0.3	35	35.2	80 - 120	99
	Copper, Cu	mg/kg	0.5	320	370.46	80 - 120	87
	Nickel, Ni	mg/kg	0.5	180	210.88	79 - 120	87
	Lead, Pb	mg/kg	1	92	107.87	79 - 120	85
	Zinc, Zn	mg/kg	2	280	301.27	80 - 121	94

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159651.002		TRH C10-C14	mg/kg	20	30	40	60 - 140	75
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	75
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	75
	TRH F Bands	TRH >C10-C16	mg/kg	25	32	40	60 - 140	80
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	75
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	80

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159650.002	Monocyclic	Benzene	mg/kg	0.1	3.2	2.9	60 - 140	110
	Aromatic	Toluene	mg/kg	0.1	2.7	2.9	60 - 140	92
		Ethylbenzene	mg/kg	0.1	2.0	2.9	60 - 140	69
		m/p-xylene	mg/kg	0.2	3.7	5.8	60 - 140	64
		o-xylene	mg/kg	0.1	2.4	2.9	60 - 140	83
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.2	5	60 - 140	104
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	81
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	97
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB159650.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	94
		TRH C6-C9	mg/kg	20	22	23.2	60 - 140	93
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.2	5	60 - 140	104
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	81
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	97
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	97

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159654.004	Mercury	mg/kg	0.05	0.20	0.01607797207	0.2	90

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159651.022		Naphthalene	mg/kg	0.1	4.3	0.03	4	108
			2-methylnaphthalene	mg/kg	0.1	<0.1	0.03	-	-
			1-methylnaphthalene	mg/kg	0.1	<0.1	0.03	-	-
			Acenaphthylene	mg/kg	0.1	4.5	0.01	4	113
			Acenaphthene	mg/kg	0.1	4.4	0	4	109
			Fluorene	mg/kg	0.1	<0.1	0.01	-	-
			Phenanthrene	mg/kg	0.1	4.5	0.08	4	111
			Anthracene	mg/kg	0.1	4.4	0.01	4	109
			Fluoranthene	mg/kg	0.1	4.4	0.13	4	106
			Pyrene	mg/kg	0.1	4.7	0.12	4	114
			Benzo(a)anthracene	mg/kg	0.1	<0.1	0.06	-	-
			Chrysene	mg/kg	0.1	<0.1	0.08	-	-
			Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0.06	-	-
			Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.02	-	-
			Benzo(a)pyrene	mg/kg	0.1	4.3	0.04	4	106
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.03	-	-
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	0.01	-	-
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.08	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	4.3	0	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	4.4	0.242	-	-
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.4	0.121	-	-
			Total PAH (18)	mg/kg	0.8	35	0.25	-	-
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.49	-	102
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.47	-	102
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.53	-	106

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159653.004	Arsenic, As	mg/kg	1	49	2.23855890944	50	94
		Cadmium, Cd	mg/kg	0.3	49	0.21957156767	50	97
		Chromium, Cr	mg/kg	0.3	56	6.75316455696	50	98
		Copper, Cu	mg/kg	0.5	66	18.7332035053	50	94
		Nickel, Ni	mg/kg	0.5	50	3.65774099318	50	93
		Lead, Pb	mg/kg	1	79	46.73661148977	50	65 ④
		Zinc, Zn	mg/kg	2	200	101.8451801363	50	-4 ④

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159651.022		TRH C10-C14	mg/kg	20	52	22	40	75
			TRH C15-C28	mg/kg	45	200	333	40	-330 ⑨
			TRH C29-C36	mg/kg	45	220	344	40	-320 ⑨
			TRH C37-C40	mg/kg	100	<100	0	-	-
			TRH C10-C36 Total	mg/kg	110	470	699	-	-
			TRH C10-C40 Total (F bands)	mg/kg	210	390	741	-	-
		TRH F Bands	TRH >C10-C16	mg/kg	25	51	28	40	58 ⑨
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	51	28	-	-
			TRH >C16-C34 (F3)	mg/kg	90	340	579	40	-610 ⑨
			TRH >C34-C40 (F4)	mg/kg	120	<120	134	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159650.004	Monocyclic Aromatic	Benzene	mg/kg	0.1	2.0	0	2.9	67
			Toluene	mg/kg	0.1	2.5	0.01	2.9	87
			Ethylbenzene	mg/kg	0.1	2.1	0.01	2.9	71
			m/p-xylene	mg/kg	0.2	4.7	0.03	5.8	81
			o-xylene	mg/kg	0.1	2.1	0.01	2.9	72

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159650.004	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	0	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.7	3.53	-	113
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.2	3.97	-	104
			d8-toluene (Surrogate)	mg/kg	-	5.3	3.64	-	107
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	4.21	-	96
		Totals	Total Xylenes	mg/kg	0.3	6.9	0.04	-	-
			Total BTEX	mg/kg	0.6	13	0.06	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE185332.001	LB159650.004		TRH C6-C10	mg/kg	25	<25	1.35	24.65	77
			TRH C6-C9	mg/kg	20	<20	1.04	23.2	78
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	5.7	3.53	-	113
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.2	3.97	-	104
			d8-toluene (Surrogate)	mg/kg	-	5.3	3.64	-	107
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	4.21	-	96
		VPH F	Benzene (F0)	mg/kg	0.1	2.0	0	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	1.29	7.25	78

MATRIX SPIKE DUPLICATES

SE185307 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

SAMPLE RECEIPT ADVICE

SE185307

CLIENT DETAILS

Contact	Priya Dass
Client	Jeffery & Katauskas Pty Ltd
Address	Rear 115 Wicks Road MACQUARIE PARK NSW 2113
Telephone	(02) 9888 5000
Facsimile	(02) 9888 5004
Email	pdass@jkgroup.net.au
Project	**St Ives**
Order Number	(Not specified)
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 22/10/2018
Report Due	Mon 29/10/2018
SGS Reference	**SE185307**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Monday 22/10/2018. Results are expected to be ready by COB Monday 29/10/2018. Please quote SGS reference SE185307 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Other Lab	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	22/10/2018	Type of documentation received	COC
Number of eskies/boxes received	1	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	5.2ºC
Sufficient sample for analysis	Yes	Turnaround time requested	Standard

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

SAMPLE RECEIPT ADVICE

SE185307

CLIENT DETAILS

Client Jeffery & Katauskas Pty Ltd

Project St Ives

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	Total Recoverable Elements in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	JHDUP3	1	26	7	10	12	8

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE185307

CLIENT DETAILS

Client Jeffery & Katauskas Pty Ltd

Project St Ives

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content
001	JHDUP3	1

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067
P: (02) 99106200
F: (02) 99106201
Attention: Aileen

EIS Job Number: E31754KT
Date Results Required: STANDARD
Page: 3 of 3

FROM:
ENVIRONMENTAL INVESTIGATION SERVICES
REAR OF 116 WICKS ROAD
MACQUARIE PARK, NSW 2113
P: 02-9888 5000 F: 02-9888 5001
Attention: Priya Dass

Location: St Ives
Sampler: JR

Sample Preserved In Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
17/10/18	51	BH112	0-0.2	G,A	0	FILL												
"	52	"	0.7-0.95	"	0.5	"				✓								
"	53	"	1.4-1.5	"	0	NATURAL		✓										
"	54	"	1.8-1.95	G	0	"												
18/10/18	55	BH113	0-0.2	G,A	0	FILL				✓								
"	56	"	0.4-0.5	"	0	"												
"	57	"	0.6-0.95	"	0.2	"												
"	58	"	1.1-1.2	"	20.2	NATURAL		✓										
"	59	"	1.5-1.6	G	2.1	"												
—	60	JHDUP1	—	"	—	Soil		✓										
—	61	JHDUP2	—	"	—	Soil		✓										
—	~~AK~~ 62	JHDUP3	—	"	—	Soil		✓					Send to SGS					
—	62	TB	—	G2	—	Sand								✓				
—	63	TS	—	"	—									✓				

SGS EHS Alexandria Laboratory

SE185307 COC
Received: 22-Oct-2018

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag
G2 - 125ml Glass Jar
V - Vial

Relinquished By:	Date:	Time:	Received By:	Date:
Priya Dass	19/10/18		COLD NOT F	19/10/18 15:00

@ 22/10/18 @2:25

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

CERTIFICATE OF ANALYSIS 203825

Client Details

Client	Environmental Investigation Services
Attention	Priya Dass
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31754KT, St Ives**
Number of Samples	4 WATER
Date samples received	24/10/2018
Date completed instructions received	24/10/2018

Analysis Details

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

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

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

Report Details

Date results requested by	31/10/2018
Date of Issue	31/10/2018

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

Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Priya Samarawickrama, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

VOCs in water			
Our Reference		203825-1	203825-2
Your Reference	UNITS	MW102	MW111
Date Sampled		23/10/2018	23/10/2018
Type of sample		WATER	WATER
Date extracted	-	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018
Dichlorodifluoromethane	µg/L	<10	<10
Chloromethane	µg/L	<10	<10
Vinyl Chloride	µg/L	<10	<10
Bromomethane	µg/L	<10	<10
Chloroethane	µg/L	<10	<10
Trichlorofluoromethane	µg/L	<10	<10
1,1-Dichloroethene	µg/L	<1	<1
Trans-1,2-dichloroethene	µg/L	<1	<1
1,1-dichloroethane	µg/L	<1	<1
Cis-1,2-dichloroethene	µg/L	<1	<1
Bromochloromethane	µg/L	<1	<1
Chloroform	µg/L	1	<1
2,2-dichloropropane	µg/L	<1	<1
1,2-dichloroethane	µg/L	<1	<1
1,1,1-trichloroethane	µg/L	<1	<1
1,1-dichloropropene	µg/L	<1	<1
Cyclohexane	µg/L	<1	<1
Carbon tetrachloride	µg/L	<1	<1
Benzene	µg/L	<1	<1
Dibromomethane	µg/L	<1	<1
1,2-dichloropropane	µg/L	<1	<1
Trichloroethene	µg/L	<1	<1
Bromodichloromethane	µg/L	<1	<1
trans-1,3-dichloropropene	µg/L	<1	<1
cis-1,3-dichloropropene	µg/L	<1	<1
1,1,2-trichloroethane	µg/L	<1	<1
Toluene	µg/L	<1	<1
1,3-dichloropropane	µg/L	<1	<1
Dibromochloromethane	µg/L	<1	<1
1,2-dibromoethane	µg/L	<1	<1
Tetrachloroethene	µg/L	<1	<1
1,1,1,2-tetrachloroethane	µg/L	<1	<1
Chlorobenzene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
Bromoform	µg/L	<1	<1

VOCs in water			
Our Reference		203825-1	203825-2
Your Reference	UNITS	MW102	MW111
Date Sampled		23/10/2018	23/10/2018
Type of sample		WATER	WATER
m+p-xylene	µg/L	<2	<2
Styrene	µg/L	<1	<1
1,1,2,2-tetrachloroethane	µg/L	<1	<1
o-xylene	µg/L	<1	<1
1,2,3-trichloropropane	µg/L	<1	<1
Isopropylbenzene	µg/L	<1	<1
Bromobenzene	µg/L	<1	<1
n-propyl benzene	µg/L	<1	<1
2-chlorotoluene	µg/L	<1	<1
4-chlorotoluene	µg/L	<1	<1
1,3,5-trimethyl benzene	µg/L	<1	<1
Tert-butyl benzene	µg/L	<1	<1
1,2,4-trimethyl benzene	µg/L	<1	<1
1,3-dichlorobenzene	µg/L	<1	<1
Sec-butyl benzene	µg/L	<1	<1
1,4-dichlorobenzene	µg/L	<1	<1
4-isopropyl toluene	µg/L	<1	<1
1,2-dichlorobenzene	µg/L	<1	<1
n-butyl benzene	µg/L	<1	<1
1,2-dibromo-3-chloropropane	µg/L	<1	<1
1,2,4-trichlorobenzene	µg/L	<1	<1
Hexachlorobutadiene	µg/L	<1	<1
1,2,3-trichlorobenzene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	101	107
Surrogate toluene-d8	%	97	97
Surrogate 4-BFB	%	94	95

vTRH(C6-C10)/BTEXN in Water					
Our Reference	UNITS	203825-1	203825-2	203825-3	203825-4
Your Reference		MW102	MW111	DUPAM1	TS
Date Sampled		23/10/2018	23/10/2018	23/10/2018	23/10/2018
Type of sample		WATER	WATER	WATER	WATER
Date extracted	-	25/10/2018	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	26/10/2018	26/10/2018	26/10/2018	26/10/2018
TRH C_6 - C_9	µg/L	<10	<10	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	<10	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	107%
Toluene	µg/L	<1	<1	<1	108%
Ethylbenzene	µg/L	<1	<1	<1	110%
m+p-xylene	µg/L	<2	<2	<2	109%
o-xylene	µg/L	<1	<1	<1	110%
Naphthalene	µg/L	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	101	107	99	100
Surrogate toluene-d8	%	97	97	94	103
Surrogate 4-BFB	%	94	95	103	100

svTRH (C10-C40) in Water				
Our Reference		203825-1	203825-2	203825-3
Your Reference	UNITS	MW102	MW111	DUPAM1
Date Sampled		23/10/2018	23/10/2018	23/10/2018
Type of sample		WATER	WATER	WATER
Date extracted	-	27/10/2018	27/10/2018	27/10/2018
Date analysed	-	30/10/2018	30/10/2018	30/10/2018
TRH C_{10} - C_{14}	µg/L	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	90	88	84

PAHs in Water - Low Level				
Our Reference	UNITS	203825-1	203825-2	203825-3
Your Reference		MW102	MW111	DUPAM1
Date Sampled		23/10/2018	23/10/2018	23/10/2018
Type of sample		WATER	WATER	WATER
Date extracted	-	27/10/2018	27/10/2018	27/10/2018
Date analysed	-	30/10/2018	30/10/2018	30/10/2018
Naphthalene	µg/L	<0.2	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	91	87	85

HM in water - dissolved				
Our Reference	UNITS	203825-1	203825-2	203825-3
Your Reference		MW102	MW111	DUPAM1
Date Sampled		23/10/2018	23/10/2018	23/10/2018
Type of sample		WATER	WATER	WATER
Date prepared	-	25/10/2018	25/10/2018	25/10/2018
Date analysed	-	25/10/2018	25/10/2018	25/10/2018
Arsenic-Dissolved	µg/L	<1	2	2
Cadmium-Dissolved	µg/L	0.2	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	14	4	4
Zinc-Dissolved	µg/L	71	24	25

Miscellaneous Inorganics			
Our Reference		203825-1	203825-2
Your Reference	UNITS	MW102	MW111
Date Sampled		23/10/2018	23/10/2018
Type of sample		WATER	WATER
Date prepared	-	24/10/2018	24/10/2018
Date analysed	-	24/10/2018	24/10/2018
pH	pH Units	5.9	5.0
Electrical Conductivity	µS/cm	1,200	520

Method ID	Methodology Summary
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.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			25/10/2018	[NT]	[NT]	[NT]	[NT]	25/10/2018	[NT]
Date analysed	-			26/10/2018	[NT]	[NT]	[NT]	[NT]	26/10/2018	[NT]
Dichlorodifluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Vinyl Chloride	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromomethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichlorofluoromethane	µg/L	10	Org-013	<10	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-Dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trans-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cis-1,2-dichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chloroform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
2,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
1,1,1-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
1,1-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Cyclohexane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbon tetrachloride	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromomethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Trichloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Bromodichloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
trans-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
cis-1,3-dichloropropene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2-trichloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibromochloromethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]
1,2-dibromoethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tetrachloroethene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
1,1,1,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromoform	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
m+p-xylene	µg/L	2	Org-013	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Styrene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,1,2,2-tetrachloroethane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
o-xylene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: VOCs in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
1,2,3-trichloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Isopropylbenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-propyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
2-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-chlorotoluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3,5-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Tert-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trimethyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,3-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Sec-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,4-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
4-isopropyl toluene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
n-butyl benzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2-dibromo-3-chloropropane	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,4-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Hexachlorobutadiene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
1,2,3-trichlorobenzene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-013	106	[NT]	[NT]	[NT]	[NT]	104	[NT]
Surrogate toluene-d8	%		Org-013	99	[NT]	[NT]	[NT]	[NT]	99	[NT]
Surrogate 4-BFB	%		Org-013	95	[NT]	[NT]	[NT]	[NT]	102	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			25/10/2018	[NT]	[NT]	[NT]	[NT]	25/10/2018	[NT]
Date analysed	-			26/10/2018	[NT]	[NT]	[NT]	[NT]	26/10/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	104	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	108	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	106	[NT]	[NT]	[NT]	[NT]	104	[NT]
Surrogate toluene-d8	%		Org-016	99	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-016	95	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			27/10/2018	[NT]	[NT]	[NT]	[NT]	27/10/2018	[NT]
Date analysed	-			29/10/2018	[NT]	[NT]	[NT]	[NT]	29/10/2018	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	123	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	123	[NT]
Surrogate o-Terphenyl	%		Org-003	92	[NT]	[NT]	[NT]	[NT]	122	[NT]

QUALITY CONTROL: PAHs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			27/10/2018	[NT]	[NT]	[NT]	[NT]	27/10/2018	[NT]
Date analysed	-			30/10/2018	[NT]	[NT]	[NT]	[NT]	30/10/2018	[NT]
Naphthalene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	98	[NT]
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	101	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	203825-2
Date prepared	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Date analysed	-			25/10/2018	1	25/10/2018	25/10/2018		25/10/2018	25/10/2018
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		101	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	0.2	[NT]		101	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		103	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		101	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		101	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	101	90
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	14	[NT]		102	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	71	[NT]		105	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/10/2018	[NT]	[NT]	[NT]	[NT]	24/10/2018	[NT]
Date analysed	-			24/10/2018	[NT]	[NT]	[NT]	[NT]	24/10/2018	[NT]
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	102	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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	Environmental Investigation Services
Attention	Priya Dass

Sample Login Details

Your reference	E31754KT, St Ives
Envirolab Reference	203825
Date Sample Received	24/10/2018
Date Instructions Received	24/10/2018
Date Results Expected to be Reported	31/10/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	4 WATER
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14.6
Cooling Method	Ice
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

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

Analysis Underway, details on the following page:

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

Sample ID	VOCs in water	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	pH	Electrical Conductivity
MW102	✓	✓	✓	✓	✓	✓	✓
MW111	✓	✓	✓	✓	✓	✓	✓
DUPAM1		✓	✓	✓	✓		
TS		✓					

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.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31754KT	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		
Attention: Aileen	Page: 1	Attention: Priya Dass

Location: St. Ives

Sampler:

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 2	Combo 3L	VOCs	pH / EC	8 Metals	PAHs	TRH/BTEX	BTEX	Hardness			
23/10/18	1	MW102	G1, G2V, H, PVC	0.6			✓	✓	✓								
↓	2	MW111	↓	0.7			✓	✓	✓								
	3	DUPAM1	G1, 2V, H, PVC	—			✓										
↓	4	TS	V	—									✓				

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

Job No: 203835

Date Received: 24/10/18

Time Received: 1150

Received By: Sourays

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers:
All analysis PQLs to ANZECC (2000) Detection Limits Please	G1 - 500mL Amber Glass Bottle G2 - 1L Amber Glass Bottle V - BTEX Vial H - HNO3 Wash PVC PVC - HDPE Plastic Bottles

Relinquished By:	Date:	Time:	Received By:	Date:
Priya Dass	24/10/18	1150	Sourays	24/10/18

Appendix D: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[21].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork where it is safe to do so. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.
- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.

[21] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Measure the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Stericup single-use filters (for heavy metals samples);
  - Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/Temperature meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;
  - Low flow peristaltic pump and associated tubing; and
  - Groundwater sampling forms.

- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements specified by the laboratory and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice.
- At the end of each water sampling complete a chain of custody form for samples being sent to the laboratory.

Decontamination Procedures for Groundwater Sampling Equipment

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[22] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[23].

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection Limit for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations: *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" (Keith, 1991).

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD).

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes. Accuracy is typically reported as percent recovery.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;

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[22] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[23] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide.*

- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling, transport and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$

SCREENING CRITERIA DEFINITIONS

The following definitions have been adopted based on Schedule B(1) of NEPM (2013) and are relevant to Tier 1 screening criteria adopted for contamination assessments.

Health investigation levels (HILs) have been developed for a broad range of metals and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions should determine the depth to which HILs apply for other land uses.

Health screening levels (HSLs) have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land use scenarios, and the characteristics of building structures. They apply to different soil types, and depths below surface to >4 m. HSLs have also been developed for asbestos and apply to the top 3m of soil.

Ecological investigation levels (EILs) have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2 m of soil.

Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum/recoverable hydrocarbon (TPH/TRH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

Groundwater investigation levels (GILs) are the concentrations of a contaminant in groundwater above which further investigation (point of extraction) or a response (point of use) is required. GILs are based on Australian water quality guidelines and drinking water guidelines and are applicable for assessing human health risk and ecological risk from direct contact (including consumption) with groundwater.

Management Limits for Petroleum hydrocarbons are applicable to petroleum hydrocarbon compounds only. They are applicable as screening levels following evaluation of human health and ecological risks and risks to groundwater resources. They are relevant for operating sites where significant sub-surface leakage of petroleum compounds has occurred and when decommissioning industrial and commercial sites.

Interim soil vapour health investigation levels (interim HILs) have been developed for selected volatile organic chlorinated compounds (VOCCs) and are applicable to assessing human health risk by the inhalational pathway. They have interim status pending further scientific work on volatile gas modelling from the sub-surface to building interiors for chlorinated compounds.

Appendix E: Data (QA/QC) Evaluation

DATA (QA/QC) EVALUATION

INTRODUCTION

This Data (QA/QC) Evaluation forms part of the validation process for the DQOs documented in Section 5.1 of this report. Checks were made to assess the data in terms of precision, accuracy, representativeness, comparability and completeness. These 'PARCC' parameters are referred to collectively as DQIs and are defined in the Report Explanatory Notes attached in the report appendices.

Field and Laboratory Considerations

The quality of the analytical data produced for this project has been considered in relation to the following:

- Sample collection, storage, transport and analysis;
- Laboratory PQLs;
- Field QA/QC results; and
- Laboratory QA/QC results.

Field QA/QC Samples and Analysis

A summary of the field QA/QC samples collected and analysed for this assessment is provided in the following table:

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Intra-laboratory duplicate (soil)	HWDUP1 (primary sample BH2 0-0.1m)	Approximately 8% of primary samples	Heavy metals, TRH/BTEX, PAHs, OCPs, OPPs and PCBs
Intra-laboratory duplicate (soil)	JHDUP1 (primary sample BH101 0-0.2m)	As above	Heavy metals, TRH/BTEX, and PAHs
Intra-laboratory duplicate (soil)	JHDUP2 (primary sample BH103 0-0.2m)	As above	Heavy metals, TRH/BTEX, and PAHs
Intra-laboratory duplicate (water)	DUPAM1 (primary sample MW111)	Approximately 50% of primary samples	Heavy metals, TRH/BTEX, and PAHs
Inter-laboratory duplicate (soil)	JHDUP3 (primary sample BH108 0-0.2m)	Approximately 3% of primary samples	Heavy metals, TRH/BTEX, and PAHs
Trip spike (soil)	TS (18/10/18)	One for the soil assessment to demonstrate adequacy of preservation, storage and transport methods	BTEX

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Trip spike (water)	TS (23/10/18)	One for the groundwater assessment to demonstrate adequacy of preservation, storage and transport methods	BTEX
Trip blank (soil)	TB (16/08/18)	One for the Preliminary Stage 1/2 assessment to demonstrate adequacy of storage and transport methods	BTEX
Trip blank (soil)	TB (18/10/18)	One for the additional assessment to demonstrate adequacy of storage and transport methods	BTEX

The results for the field QA/QC samples are detailed in the laboratory summary tables (Table H to Table M inclusive) attached to the assessment report and are discussed in the subsequent sections of this Data (QA/QC) Evaluation report.

Data Assessment Criteria

EIS adopted the following criteria for assessing the field and laboratory QA/QC analytical results:

Field Duplicates

Acceptable targets for precision of field duplicates in this report will be less than 50% RPD for concentrations greater than 10 times the PQL, less than 75% RPD for concentrations between five and 10 times the PQL and less than 100% RPD for concentrations that are less than five times the PQL. RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Field Blanks

Acceptable targets for field blank samples in this report will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to typical background concentrations in soils and published drinking water guidelines for waters.

Trip Spikes

Acceptable targets for trip spike samples in this report will be 70% to 130%. This is in line with spike recovery limits adopted by the laboratory for organic analysis.

Laboratory QA/QC

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the laboratory reports. These criteria were developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the acceptable limits adopted by the primary laboratory (Envirolab) is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics;
- 60-140% recovery acceptable for organics; and
- 10-140% recovery acceptable for VOCs.

Surrogate Spikes

- 60-140% recovery acceptable for general organics; and
- 10-140% recovery acceptable for VOCs.

Method Blanks

- All results less than PQL.

DATA EVALUATION

Sample Collection, Storage, Transport and Analysis

Samples were collected by trained field staff in accordance with the EIS SSP. The SSP was developed to be consistent with relevant guidelines, including NEPM (2013) and other guidelines made under the CLM Act 1997.

Appropriate sample preservation, handling and storage procedures were adopted. Laboratory analysis was undertaken within specified holding times in accordance with Schedule B(3) of NEPM (2013) and the laboratory NATA accredited methodologies.

Review of the project data also indicated that:

- COC documentation was adequately maintained;
- Sample receipt advice documentation was provided for all sample batches;
- All analytical results were reported; and
- Consistent units were used to report the analysis results.

Laboratory PQLs

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC, with the exception of the anthracene PQL which was 10 times greater than the ecological SAC, 1,1-dichloroethene PQL which was 3 times greater than the human health recreational SAC and benzo(a)pyrene PQL which was 10 times greater than the human health SACs for groundwater analysis. In light of the PAH and VOC concentrations reported for soil and/or groundwater, EIS are of the opinion that this is not significant, and it does not affect the quality of the dataset as a whole or the outcome of the assessment.

Field QA/QC Sample Results

Field Duplicates

The results indicated that field precision was acceptable. RPD non-conformances were reported for some analytes as discussed below:

- Elevated RPDs were reported for naphthalene in HWDUP1/BH2 (0.0-0.1m)
- Elevated RPDs were reported for zinc in JHDUP1/BH101 (0.0-0.2m)
- Elevated RPDs were reported for chromium and nickel in JHDUP2/BH103 (0.0-0.2m)

The elevated RPDs associated with the heavy metals are most likely the result of sample heterogeneity. The elevated RPD associated with naphthalene is most likely the result of the very low concentrations of naphthalene encountered. At very low concentrations slight differences in results is a disproportionate impact on the RPD value.

As both the primary and duplicate sample results were less than the SAC, the exceedances are not considered to have had an adverse impact on the data set as a whole.

Field Blanks

During the Preliminary Stage 1/2 investigation and the additional investigation, one soil trip blank each was placed in the esky during sampling and transported back to the laboratory. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur.

Trip Spikes

The results ranged from 97% to 110% and indicated that field preservation methods were appropriate.

Laboratory QA/QC

The analytical methods implemented by the laboratory were performed in accordance with their NATA accreditation and were consistent with Schedule B(3) of NEPM (2013). The frequency of data reported for the laboratory QA/QC (i.e. duplicates, spikes, blanks, LCS) was considered to be acceptable for the purpose of this assessment. EIS note that due to the limited number of samples submitted for analysis, duplicates and matrix spikes were not reported. This is not considered to have an impact on the data quality for this assessment.

A review of the laboratory QA/QC data identified the following minor non-conformances:

- The RPD failed acceptance criteria for lead in a sample due to sample heterogeneity (Lab report SE185307);
- The recovery failed acceptance criteria for lead and zinc in a sample due to matrix interference (Lab report SE185307); and
- The recovery failed acceptance criteria for a number of TRH fractions in a sample due to sample heterogeneity (Lab report SE185307).

DATA QUALITY SUMMARY

EIS are of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

A number of results from field duplicates indicated some uncertainty in quantification for PAHs and heavy metals. Due to the characteristics of the duplicate samples, the uncertainty is not considered to materially impact the report findings.

Non-conformances were reported for some laboratory QA/QC analysis. These non-conformances were considered to be sporadic and minor, and were not considered to be indicative of systematic sampling or analytical errors. On this basis, these non-conformances are not considered to materially impact the report findings.

There was only one groundwater monitoring event undertaken for the assessment. On this basis there is some uncertainty around the representativeness of the groundwater data, particularly during different climatic conditions and after wet/dry periods. However, given the low contaminant concentrations reported, the site history and the surrounding land uses, this is not considered to alter the conclusions of the assessment.

Appendix F: Field Work Documents

JOB NO: E31754KT
LOCATION: St Ives High School, Yarrabung Road St Ives

FIELD CALIBRATION FORM

PID

Make: MiniRAE	Model: 2000 17/10/18 & 18/10/18	Unit:	Date of last factory calibration: 19/5/R
Date of calibration: 23/10/18		Name of Calibrator: AM	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 100 ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

DISSOLVED OXYGEN

Make: 18/10/18	Model: Aqua DY
Date of calibration: 23/10/18	Name of Calibrator: AM
Span value: 70% to 130%%	
Measured value: 91%	
Measured reading Acceptable (Yes/No):	

pH METER

Make: Orion 18/10/18	Model: Four star	
Date of calibration: 23/10/18	Name of Calibrator: AM	
Buffer 1: Theoretical pH = 7.01± 0.01	Expiry date: 8/19	Lot No: 315066
Buffer 2: Theoretical pH = 4.01± 0.01	Expiry date: 5/19	Lot No: 312725
Measured reading of Buffer 1: 6.99		
Measured reading of Buffer 2: 4.07		
Slope:	Measured reading Acceptable (Yes/No):	

CONDUCTIVITY METER

Make: Orion 18/10/18		Model: Four star	
Date: 23/10/18	Name of Calibrator: AM		Temperature: 20.7 °C
Calibration solution: Conductivity Standard		Expiry date: 6/19	Lot No: 313391
Theoretical conductivity at temperature (see solution container): 1295 µS/cm			
Measured conductivity: 1276 µS/cm		Measured reading Acceptable (Yes/No):	

REDOX METER

Make: Orion 18/10/18	Model: Four star	
Date of calibration: 23/10/18	Name of Calibrator: AM	
Calibration solution: ORP Solution	Expiry date: 10/19	Lot No: 2422
Theoretical redox value: 240mV		
Measured redox reading: 244.5 mV	Measured reading Acceptable (Yes/No):	

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	JDH Architects	**Job No.:**	E31754KT
Project:	Proposed Alterations & Additions	**Well No.:**	MW102
Location:	ST IVES HIGH SCHOOL, ST IVES, NSW	**Depth (m):**	6m

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Bailer	**SWL – Before (m):**	4.5m
Date:	18/10/18	**Time – Before:**	11:00am
Undertaken By:	JH	**SWL – After (m):**	9m
Total Vol. Removed:	4L	**Time – After:**	11:15am
PID Reading (ppm):	0		

Comments: Heavy rain overnight - possible surface water infiltration

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
0.5	19.3	3.3	486.0	5.70	157.3
1.0	19.7	2.3	404.1	5.90	103.6
2.0	19.6	2.0	378.9	5.91	80.2
3.0	18.5	1.3	356.2	5.85	51.0
4.0	18.4	1.2	352.6	5.83	31.9

Comments:Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI keeps playing up - turning itself on and off
Very silty - too silty for pump
- used bailer

Tested By:	JH
Date Tested:	18/10/18
Checked By:	PD
Date:	18/10/18

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	JDH Architects	**Job No.:**	E31754KT
Project:	Proposed Alterations & Additions	**Well No.:**	MW111
Location:	ST IVES HIGH SCHOOL, ST IVES, NSW	**Depth (m):**	6.7m

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Electric/Bailer	**SWL – Before (m):**	4.5m
Date:	18/10/18	**Time – Before:**	11:40am
Undertaken By:	JH	**SWL – After (m):**	0.3(5.4)
Total Vol. Removed:	18L+	**Time – After:**	12:00pm
PID Reading (ppm):	0		

Comments: Heavy rain overnight - possible surface water infiltration

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
1	19.5	0.9	232.7	5.23	172.2
2	18.8	0.5	233.3	5.17	162.2
4	18.6	0.4	234.5	5.14	160.3
6	18.9	0.5	239.2	5.14	142.2
8	19.3	3.0	306.2	5.52	147.2
10	19.3	1.6	342.2	5.36	25.9
12	19.5	1.5	418.4	5.46	24.3
14	19.5	0.8	443.6	5.66	38.3
16	19.3	0.8	441.6	5.68	4.6
18	19.3	0.6	441.8	5.72	1.6

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Very silty - used electric pump until too silty.
- used bailer to remove as much silt as possible. <0.3m of silt remaining

YSI 3 playing up - Turning itself on and off

Tested By:	JH
Date Tested:	18/10/18
Checked By:	PD
Date:	18/10/18

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	JDH Architects	**Job No.:**	E31754KT
Project:	Proposed Alterations & Additions	**Well No.:**	102
Location:	ST IVES HIGH SCHOOL, ST IVES, NSW	**Depth (m):**	6m

WELL FINISH

X	**Gatic Cover**		**Standpipe**		**Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic	**SWL – Before:**	4.63
Date:	23/10/18	**Time – Before:**	10:10
Undertaken By:	AM	**Total Vol Removed:**	4
Pump Program No:	85937	**PID (ppm):**	0.6

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:16	5.02	1		19.4	0.6	871	5.77	-107.2
10:20	5.38	2		18.7	2.4	685	5.90	-61.1
10:23	5.50	3		19.1	2.7	674	5.92	-50.3
Started sampling								

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved (YES / (NO))

High silt load sampling started done to low water

Sampling Containers Used: 1 x glass amber, 4 x BTEX vials, 0 x H2NO3 plastic, 1 x H2SO4 plastic, 0 x unpreserved plastic

Tested By: ~~Priya Dass~~ AM	**Remarks:**
Date Tested: 23/10/18	- All measurements are corrected to ground level
Checked By: PD	- SWL is an abbreviation for standing water level
Date: 23/10/18	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	JDH Architects	Job No.:	E31754KT
Project:	Proposed Alterations & Additions	Well No.:	11
Location:	ST IVES HIGH SCHOOL, ST IVES, NSW	Depth (m):	6.7

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peristaltic	SWL – Before:	2.74
Date:	23/10/18	Time – Before:	10:55
Undertaken By:	AM	Total Vol Removed:	27
Pump Program No:	85937	PID (ppm):	0.7

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
11.00	2.57	1		20.1	0.5	317.2	5.37	-40.7
11:05	3.38	2		19.6	0.3	310.5	5.36	-46.5
11:10	3.77	3		19.5	0.2	331.5	5.34	-61.2
11:14	3.88	4		19.6	0.2	347	5.31	-67.1
11:17	4.13	5		19.4	0.2	343.5	5.32	-69.8
11:20	4.33	6.7		19.4	0.2	355.5	5.29	-75.8
11.23	4.50	8		19.4	0.2	350.8	5.27	-78.2
11:26	4.68	9		19.3	0.2	365.9	5.27	-82.3
11:29	4.79	10		19.4	0.3	365.6	5.26	-82.3
11:32	4.88	11		19.3	0.5	371.2	5.29	-82.3
11:35	4.95	12		19.3	0.7	377.9	5.22	-82.1
11.38	5.02	13		19.3	0.7	383.2	5.17	-79.0
11.41	5.11	14		19.4	0.6	388.8	5.15	-81.3
11.44	5.18	15		19.4	0.6	393.0	5.16	-83.4
11:47	5.23	16		19.5	0.5	399.6	5.12	-84.1
11:50	5.29	17		19.5	0.5	407.4	5.11	-82
11:53	5.35	18		19.5	0.6	405.3	5.08	-80.5
11:56	5.42	19		19.5	0.7	411.3	5.07	-80
11:59	5.47	20		19.4	0.8	415.8	5.08	-78.6
12:02	5.53	21		19.4	1.3	419.3	5.11	-72.8
12:05	5.57	22		19.4	1.3	417.2	5.08	-72.4
12:08	5.63	23		19.5	1.6	422.2	5.09	-72.0
12.11	5.63	24		19.5	1.8	426.1	5.15	-74.6
12:14	5.63	25		19.6	1.7	431.2	5.21	-77.9
Started sampling								

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

High silt loading

Sampling Containers Used: 2 x glass amber, 6 x BTEX vials, 5 x H2NO3 plastic, 2 x H2SO4 plastic, 1 x unpreserved plastic

DUPAM1

Tested By: ~~Priya Dass~~ AM

Date Tested: 23/10/18

Checked By: PD

Date: 23/10/18

Remarks:

- All measurements are corrected to ground level
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

Appendix G: Guidelines and Reference Documents

Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). Acid Sulfate Soils Manual

Australian and New Zealand Environment Conservation Council (ANZECC), (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality

CRC Care, (2011). Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document

CRC Care, (2017). Technical Report No. 39 – Risk-based management and guidance for benzo(a)pyrene

Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

National Health and Medical Research Council (NHMRC), (2011). National Water Quality Management Strategy, Australian Drinking Water Guidelines

NSW Department of Environment and Conservation, (2007). Guidelines for the Assessment and Management of Groundwater Contamination

NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines

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

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Olszowy, H., Torr, P., and Imray, P., (1995). Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy No.55 – Remediation of Land 1998 (NSW)

World Health Organisation (WHO), (2008). Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality

Western Australia Department of Health, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia