ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

MIDSON GROUP PTY LTD

ON

STAGE 2 ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

AT

238 MONA VALE ROAD, ST. IVES

NOVEMBER 2014 **REF: E26305Krpt2.1**

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1 INTRODUCTION

Midson Group Pty Ltd (the 'client') commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake a Stage 2 Environmental Site Assessment (ESA) for the proposed residential aged care facility development at 238 Mona Vale Road, St Ives, NSW 2075 ('the site').

The site is identified as Lot 1, 2 and 3 in DP1091770 and Lot 1 in DP238521. At the time of this investigation the site was occupied by a disused garden centre and a residential dwelling.

The ESA was undertaken generally in accordance with EIS proposals (Ref: EP6921Krev1 and EP8214Krev1) of 18 February 2013 / 30 July 2014 and written email acceptance from Midson Group.

A geotechnical investigation was undertaken in conjunction with the ESA by JK Geotechnics[1]. The results of the investigation are presented in a separate report (Ref. 26305Zrpt2, dated March 2012[2]).

1.1 Proposed Development Details

The proposed development includes demolition of all buildings and structures on the site and construction of a new residential aged care facility. The proposed new development includes three above ground levels incorporating residential apartments and various facilities such as function rooms, laundry, lounge rooms, dining rooms, hairdresser, waste storage, a store, cafe, activities room. A single level basement car parking area is proposed beneath the west wing of the building adjacent to Link Road. The building layout is generally L-shaped in plan view with a 5m set back from Link Road and Mona Vale Road. A 9m setback is proposed on the Killeaton Street side of the site, this area includes driveways, courtyards and landscaped areas.

1.2 Objectives

The objectives of the ESA are to:

- Assess the potential for human health or environmental risks posed by the contaminants identified in the Stage 1 ESA; and
- Provide a waste classification for the off-site disposal of soil excavated for the development.

[1]Geotechnical division of J&K Group

[2]Referred to as JK Report

1.3 Scope of Work

The scope of work included:

- A review of the previous Stage 1 ESA report prepared by EIS;
- Design and implementation of a field sampling and laboratory analysis program;
- Interpretation of the analytical results based on the Site Assessment Criteria (SAC) adopted for the ESA; and
- Preparation of a report presenting the results of the ESA.

The ESA was generally undertaken with reference to regulations/guidelines outlined in the table below. Individual guidelines applicable for this ESA are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Amendment Act (2008[3])
State Environmental Planning Policy No.55 – Remediation of Land (1998[4])
NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (1997[5])
Guidelines on the Duty to Report Contamination[6]
National Environmental Protection (Assessment of Site Contamination) Amendment Measure (2013[7])
NSW EPA Contaminated Sites Sampling Design Guidelines (1995[8])
NSW DECCW Waste Classification Guidelines - Part 1: Classifying Waste (2009[9])
Working with Asbestos Guide (2008[10])
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000[11])
Australian Drinking Water Guidelines (2011[12])

[3] *Contaminated Land Management Amendment Act,* NSW Government Legislation, 2008 (CLM Amendment Act 2008)

[4] *State Environmental Planning Policy No. 55 – Remediation of Land,* NSW Government, 1998 (SEPP55)

[5] *Guidelines for Consultants Reporting on Contaminated Sites,* NSW EPA, 1997 (Reporting Guidelines 1997)

[6] *Guidelines on the Duty to Report Contamination*, NSW EPA, Draft 2011 (Duty to Report Contamination 2011)

[7] National Environment Protection Council (NEPC), (2013), *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1).* (referred to as NEPM 2013)

[8] *Contaminated Sites Sampling Design Guidelines,* NSW EPA, 1995 (EPA Sampling Design Guidelines 1995)

[9] *Waste Classification Guidelines, Part 1: Classifying Waste,* NSW DECCW, 2009 (Waste Classification Guidelines 2009)

[10] *Working with Asbestos Guide,* NSW WorkCover, 2008 (WorkCover Working with Asbestos Guide 2008)

[11] *Australian and New Zealand Guidelines for Fresh and Marine Water Quality,* ANZECC, 2000 (ANZECC 2000)

[12] *Australian Drinking Water Guidelines*, National Health and Medical Research Council, 2011 (NHMRC 2011)

2 BACKGROUND

EIS have previously prepared the following reports for the site:

- EIS (2013a), *Report to Midson Group Pty Ltd on Stage 1 Preliminary Contamination Assessment for Proposed Residential Aged Care Facility Development at 238 Mona Vale Road, St. Ives*, Ref: E26305Krpt, dated February 2013; and
- EIS (2013b), *Report to Midson Group Pty Ltd on Stage 2 Preliminary Contamination Assessment for Proposed Residential Aged Care Facility Development at 238 Mona Vale Road, St. Ives*, Ref: E26305Krpt2, dated March 2013.

The previous EIS investigations to date have identified the following:

- The site history indicates agricultural use (farm, orchid and nursery) since at least 1909;
- Fill material was encountered across the site with a depth range of 0.075m to 0.65m, the average depth 0.29m;
- Fill analysis identified elevated levels of arsenic, lead and trace amounts of Organochlorine pesticides (OCP);
- At one location, elevated arsenic was found in the shallow natural soil;
- Groundwater analysis identified elevated concentrations of copper, zinc (considered to be associated with urban water infrastructure and runoff) and OCP;
- Based on the historical use of the site and the soil/groundwater laboratory results, site contamination is considered to be associated with the use of pesticides; and
- The site history and laboratory data indicate a potential contamination issue associated with pesticide use.

3 DATA QUALITY OBJECTIVES

3.1 DQOs for the Assessment

The DQO process includes a clear statement of the objectives of the study and a methodology for collecting enough data of sufficient quality to support the decisions of the study. The DQOs provide a systematic approach for undertaking the assessment and outlines the criteria against which the data can be assessed.

A methodology for establishing the DQOs is presented in the US EPA document *Data Quality Objectives Process for Hazardous Waste Site Investigations* (2000[13]). This methodology has been adopted by the NEPC in NEPM 1999, AS4482.1-2005[14]and the Site Auditor Guidelines 2006. The main steps involved in preparing the DQOs include:

1. State the problem;
2. Identify the decision;
3. Identify inputs into the decision;
4. Study boundaries;
5. Develop a decision rule;
6. Specify limits on decision errors; and
7. Optimise the design for obtaining data.

The first six steps provide qualitative and quantitative statements which are used in the final step to develop a data collection plan. The data is then assessed against adopted performance criteria.

3.1.1 State the Problem

The investigations previously undertaken at the site (see **Section 2**) have identified the potential for the site to have been contaminated by historical activities. The purpose of this assessment is to undertake soil and groundwater testing in order to identify the presence of contamination and assess the potential risk to human health and the environment.

3.1.2 Identify the Decision

The assessment aims to address the following decisions:

- Does the site history indicate previous land uses that may have resulted in contamination;

[13]*Data Quality Objectives Process for Hazardous Waste Site Investigations,* US EPA, *2000* (US EPA 2000)
[14]*Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil,* Standards Australia, 2005 (AS 2005)

- Does the site inspection indicate the presence of potential on-site and/or off-site contamination sources;
- Are the contaminant concentrations above the site assessment criteria (SAC);
- Has the contamination source and extent been identified;
- Has groundwater been impacted;
- Is there potential for off-site migration of contamination;
- Does the contamination pose a potential human health risk;
- Does the contamination pose a potential ecological or environmental risk;
- Are there any potential receptors which may be impacted by the contamination; and
- Can remediation measures be adopted to make the site suitable for the proposed development.

3.1.3 Inputs into the Decision

The following inputs will be used to address the decisions:

Table 3-1: Inputs into the Decision

Inputs	Details
Background Information	Review of previous Stage 1 ESA prepared by EIS including: • Site Inspection & Physical Setting; • Site History Assessment • Conceptual Site Model (CSM)
Sampling	Soil and groundwater sampling will be undertaken as outlined in **Section 6.**
Laboratory Analysis	Soil and groundwater samples will be analysed for the PCC identified in the EIS Stage 1 Assessment (Feb., 2013) outlined in **Section 2.**
Assessment of Analytical Data	The Data Quality Indicators (DQIs) that will be used to assess the analytical data are outlined in **Section 3.2**.
Assessment Criteria	Analytical results will be compared to the SAC outlined in **Section 5.**

3.1.4 Study Boundary

The ESA will be confined to the site boundaries as shown in Figure 2.

3.1.5 Develop a Decision Rule

The analytical results will be compared with the SAC as outlined in **Section 5**. Statistical analysis will be undertaken on the analytical results (if required) as outlined in the EPA Sampling Design Guidelines 1995. The following criteria will be adopted for the assessment:

- The 95% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC;
- The standard deviation (SD) of the results must be less than 50% of the SAC; and
- No single value exceeds 250% of the relevant SAC.

UCL calculations may not be required if all results are below the SAC. Further assessment or remediation will be required when the concentration of contaminants exceed the above criteria.

The groundwater analytical results will be compared to the Groundwater Investigation Levels (GILs) as outlined in **Section 5**. The results will be assessed as either above or below the GILs.

A review of the field and laboratory DQIs will be undertaken as outlined in **Section 3.2**.

3.1.6 Specify Limits on Decision Errors

Decision errors are false positive (i.e. stating the site is free of contamination when it is not) or false negative (i.e. stating that the site is contaminated when it is not). The more significant error is the false positive which may result in potential risks to human health and the environment. To account for this, the ESA has assumed that elevated concentrations of contaminants are present in the samples unless demonstrated otherwise.

3.1.7 Optimise the Design for Obtaining Data

The Site Auditor Guidelines 2006 recommend evaluating the data set as a whole to determine any limitations within the data set. The overall data set will be optimised by reviewing the data as the project proceeds. When necessary, adjustments will be made to the sampling or analytical program.

3.2 DQIs for Analytical Data

The analytical data will be assessed against the following DQIs: precision, accuracy, representativeness, completeness and comparability. Definitions of the individual DQIs

are presented in Appendix C. The table below outlines the steps that will be taken to address the DQIs:

Table 3-2: DQIs

Indicator	Methods
Completeness	Data and documentation completeness will be achieved by: • Preparation of chain of custody (COC) records; • Review the laboratory sample receipt information; • Use of National Association of Testing Authorities (NATA) registered laboratories for all analysis; • Visual and PID screening of samples during the investigation; and • Laboratory analysis to target PCC.
Comparability	Data comparability will be achieved by: • Maintaining consistency in sampling techniques; • Use of appropriate preservation, storage and transport methods; and • Use of consistent analysis techniques and reporting standards by the laboratories.
Representativeness	Data representativeness will be achieved by: • Appropriate coverage of sample locations across accessible areas of the site; and • Representative coverage of analysis for PCC.
Precision	Precision will be achieved by: • Calculating the relative percentage difference (RPD) of duplicate samples; • The following acceptance criteria will be used to assess the RPD results: ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results > 5 times PQL, RPDs < 100% are acceptable; and • An explanation is provided if RPD results are outside the acceptance criteria. As a conservative measure, the higher value is adopted when the value exceeds the SAC.
Accuracy	Accuracy will be achieved by: • Use of trained and qualified field staff; • Appropriate industry standard sampling equipment and decontamination procedures; • Sampling and screening equipment will be factory calibrated on a regular basis. Calibration will be checked internally prior to use; • Sampling and equipment decontamination;

Indicator	Methods
	• Collection and analysis of field Quality Assurance (QA) and Quality Control (QC) samples for PCC; • As a minimum, the field QA/QC analysis will include: ➢ 5% of samples as inter-laboratory duplicates; ➢ 5% of samples as intra-laboratory duplicates; ➢ 1 trip blank; ➢ 1 rinsate sample of field equipment, and ➢ 1 trip spike sample per batch of volatiles; • Acceptable concentrations in trip blanks, trip spikes and field rinsate samples. Non-compliance to be documented in the report; • Appropriate sample preservation, handling, holding time and COC procedure; • Review of the primary laboratory QA/QC data including: RPDs, surrogate recovery, repeat analysis, blanks, laboratory control samples (LCS) and matrix spikes; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ RPDs: o results that are < 5 times the PQL, any RPD is acceptable; and o results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ LCS recovery and matrix spikes: o 70-130% recovery acceptable for metals and inorganics; o 60-140% recovery acceptable for organics; and o 10-140% recovery acceptable for VOCs; ➢ Surrogate and Trip Spike recovery: o 60-140% recovery acceptable for general organics; and o 10-140% recovery acceptable for VOCs; ➢ Blanks: All less than PQL (ALTPQL); and • Reporting to industry standards.

4 SITE INFORMATION AND PHYSICAL SETTING

4.1 Site Identification

Table 4-1: Site Identification Information

Site Address:	238 Mona Vale Road, St Ives, NSW 2075
Lot & Deposited Plan:	Lot 1, 2 and 3 in DP1091770 and Lot 1 in DP238521
Current Land Use:	Commercial
Proposed Land Use:	Commercial
Local Government Authority:	Ku-Ring-Gai Council
Current Zoning:	R3 Medium Density Residential (LEP 2012)
Site Area:	5,612m^2
RL (AHD) (approx.):	155m
Geographical Location (MGA) (approx.):	N: 6221320 E: 1443520
Site Location Plan:	Figure 1
Site Layout and Borehole Location Plan:	Figure 2

4.2 Site Location and Setting

The site is located within the metropolitan area of Sydney, approximately 17km from the Sydney CBD. The surrounding areas are predominantly residential, with the exception of commercial properties located to the south-east of the site. The site is triangular shaped and extends from Killeaton Street to the north, Link Road to the south-west and Mona Vale Road to the south-east boundary.

4.3 Topography

The regional topography is characterised by slightly undulating hill slopes of approximately 3°- 8°. The site is located within a low depression with topography falling towards the site centre at approximately 2°-3°. The site topography had been altered to accommodate the existing development and included several terraced areas retained by brick/concrete walls (less than 1m high). The lowest area of the site appeared to be the central section, with the lowest point located in the central north section adjacent to Killeaton Street. The layout of the site stormwater system suggests that water was directed to the lowest point of the site.

4.4 Site Inspection

A walkover inspection of the site and immediate surrounds was undertaken on 5 February 2013. The inspection was limited to accessible areas of the site and included an internal inspection of the majority of the buildings.

At the time of the inspection, the site was occupied by a disused garden centre which generally consisted of gravel yards, a hardstand asphaltic concrete car park and concrete paved footpaths. A concrete slab was located in the north-west section of the site. The majority of the site was generally open apart from a network of shade providing structures located along the south, west and south-east sections of the site. Various trees and shrubs were present in flowerbeds throughout the site.

A wooden building with a colourbond awning was located in the north-east corner of the site. An unmarked and partially exposed water pipe was observed in this area and was presumed to be associated with the former nursery's watering system. A single storey timber and fibro building was located adjacent to the entrance, off Killeaton Street. This building appeared to have been used as a former nursery with a network of awnings attached to the rear. A tin roof shed (possibly used for storage) with an exposed earth floor was situated next to the concrete slab at the north-west section of the site. The earth floor inside the shed appeared to be stained. A disused single-storey, brick and fibro residential building with a tiled roof was located along the south-east boundary. A toilet block and storage shed were semi-detached to the south side of the residential building.

The surrounding land use consisted of low to high density residential developments to the north and south west of the site. The area to the south east of the site comprised of commercial properties including a childcare centre and church.

5 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for this ESA are outlined in the table below. The SAC has been derived from NEPM 2013 and other guidelines as outlined in **Section** 1.3. Explanatory notes are included in the attached appendices.

The guideline values for individual contaminants outlined in Schedule B1 of the NEPM 2013 are reproduced in the appendices. The criterion for the individual contaminants analysed for this assessment are presented in the attached report tables.

Table 5-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs)	The proposed land use is high density residential. The HIL-B criteria has been adopted for this ESA.
Health Screening Levels (HSLs)	The HSL-B criteria for soil has been adopted for this ESA. An assessment of soil vapour is outside the scope of this ESA. Further consideration of vapour risks would be required in the event that particular contaminants are identified during the ESA.
Ecological Assessment Criteria	A detailed assessment of ecological risk has not been undertaken for this ESA. We have adopted the most conservative guideline concentrations as a preliminary screening. The EILs for selected metals have been derived using the ABC values for high traffic (25th percentiles) areas for old suburbs of NSW published in Olszowy et. al. (1995[15]).
Management Limits for TPH	The site history assessment has not identified any USTs or other fuel storage facilities at the site. These limits are not considered necessary for this ESA.
Asbestos in Soil	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion for the Preliminary Site Investigation (PSI).
Waste Classification (WC) Criteria	The proposed development includes excavation for a basement level. A WC will be required for the off-site disposal of material excavated for the development. The criteria outlined in the Waste Classification Guidelines 2009 have been adopted for this investigation.

[15] 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.

Guideline	Applicability
Groundwater Investigation Levels (GILs)	ANZECC 2000: The closest receiving water body in the vicinity of the site is Ku-Ring-Gai Creek which is located 650m down gradient from the site. This water body predominantly sustains a freshwater ecosystem. Hence the freshwater trigger values have been adopted for the assessment. The NSW EPA promotes the use of trigger values for the protection of 95% of aquatic ecosystems, except where the contaminants have the potential to bio-accumulate, in which case the 99% trigger values are recommended. The 95% trigger values have been adopted for this assessment. Where necessary, the low reliability trigger values are quoted. ADWG 2011: The groundwater bore search did not indicate the presence of bores registered for domestic use in the vicinity of the site. The abstraction and use of groundwater for drinking purposes is unlikely to occur at the site. These guidelines have not been adopted. USEPA: In the absence of locally endorsed guidelines in groundwater, the USEPA Region 9 PRGs for 'Tap Water' have been adopted. It is noted that these guidelines have not been endorsed by NSW EPA and are used only as a preliminary screening tool.

5.1 Hydrocarbon Fractions

The EIS 2013b ESA was undertaken prior to the finalisation of the new NEPM 2013. Assessment of the old Total petroleum hydrocarbon (TPH) results was restricted by the fact that the guidelines for the Health Screening Level (HSL) TPH fractions specified in Schedule B1 of the NEPM 2013 are slightly different to the TPH fractions presented in the old laboratory reports dated 2011. In this assessment we have not attempted to re-calculate the new fractions, we have simply assessed the old TPH fractions against the new TPH fractions specified in the NEPM 2013.

5.2 General Approvals of Immobilisation (GAI)

Significant amounts of waste ash and gravely slag were available in the late nineteenth and early twentieth centuries as a result of the use of coal for industrial and domestic heating purposes. Widespread use of ash waste (either as ash or mixed with other soil and waste materials) as fill material was common in the suburbs of Sydney at this time.

To account for the presence of ash and slag, the NSW EPA has published the following:

Table 5-2: GAIs

Approval Number	Waste Stream	Contaminants	Waste Assessment Requirements
1999/05[16]	Ash, Ash-contaminated natural excavated materials or coal-contaminated natural excavated material	Polycyclic Aromatic Hydrocarbons (PAHs) including Benzo(a)pyrene (B(a)P)	The SCC limits for PAHs and B(a)P outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to the leachable concentration (TCLP) value of B(a)P alone. Disposal restrictions apply for material classified under this GAI.
1999/07[17]	Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials	Beryllium, Chromium (VI), lead, nickel, PAHs and B(a)P	The SCC limits for these contaminants outlined in the Waste Classification Guidelines 2009 do not apply for the assessment of this waste stream. The material can be classified according to their leachable concentrations (TCLP) values alone.

[16] http://www.environment.nsw.gov.au/resources/waste/GenImmobApp_1999-05_Ash_ACNEM_or_CCNEM.pdf (GAI 1999/05)
[17] http://www.environment.nsw.gov.au/resources/waste/GenImmobApp_1999-07_Metallurgical_furnace_slag.pdf (GAI 2009/07)

6 INVESTIGATION PROCEDURE

6.1 Soil Sampling Rationale

The NSW EPA Sampling Design Guidelines 1995 recommend a sampling density for a contamination assessment based on a systematic sampling pattern. Based on the size of the investigation area, the guidelines provide a minimum number of sampling points required for the investigation.

The guidelines recommend sampling from a minimum of 14 evenly spaced sampling points for a site of this size (approximately 5,570m^2).

Samples for this investigation were obtained from the following number of sampling points for each stage of the ESA:

- February 2013: Fourteen (14) evenly spaced sampling points as shown on the attached Figure 2.
- August 2014: Twelve (12) additional boreholes generally located between the previous boreholes and in accessible areas of the site.

This minimum sampling density has been meet.

Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings.

6.1.1 Soil Sampling Methods

Sampling locations were set out using a tape measure. Locations were marked using spray paint. The sampling locations were cleared for underground services prior to drilling.

Boreholes BH101 to BH106 were drilled on the 28 February 2013 using a track mounted hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler.

Boreholes BH107 to BH114 inclusive were drilled on the 25 and 26 February 2013 using hand equipment.

Boreholes BH201 to BH212 inclusive were drilled on the 7 August 2014 using hand equipment.

Soil samples were collected from the fill and natural profiles encountered during the investigation. Additional fill samples were obtained when relatively deep fill (>0.5m) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. All samples were recorded on the borehole logs attached in Appendix A.

During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis.

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. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date.

6.1.2 VOC Screening

A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for BTEX analysis.

The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source.

The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

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. The PID headspace data is presented on the COC documents.

6.1.3 Decontamination and Sample Preservation

Details of the decontamination procedure adopted during sampling are presented in Appendix C. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. A rinsate sample was obtained during the decontamination process as part of the field QA/QC.

Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS4482.1-2005 and AS4482.2-1999[18] as summarised in the following table:

Table 6-1: Soil Sample Preservation and Storage

Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4°, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals).
VOCs (TPH/BTEX)	As above	Store at <4°, analysis within 14 days
PAHs, OCP, OPP & PCBs	As above	Store at <4°, analysis within 14 days
Asbestos	Sealed plastic bag	None

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures. Field sampling protocols adopted for this assessment are summarised in the attached Appendices.

6.2 Groundwater Sampling

6.3 Groundwater Sampling Rationale

The assessment included the installation of two temporary groundwater standpipes in selected boreholes at the site as shown on Figure 2. The two standpipes were located adjacent to the up gradient and the down gradient ends of the site. The rationale for these locations was to assess the groundwater flowing across the site. The direction of groundwater flow was assumed to be in a similar direction to the site slope.

6.3.1 Monitoring Well Installation

The temporary groundwater standpipes details are documented on appropriate borehole logs presented in Appendix A.

The temporary groundwater standpipes were installed to a depth of approximately 6m below existing site levels. The standpipes were constructed from 50mm diameter PVC that was hand slotted from the surface to the base of the boreholes.

[18] *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part2: Volatile Substances,* Standards Australia, 1999 (AS 1999)

6.3.2 Groundwater Sampling

The temporary groundwater standpipes were sampled using a dedicated disposable PVC bailer

The duplicate sample was 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.

6.3.3 Sample Preservation

The samples were preserved in accordance with water sampling requirements detailed in NEPM 2013 and placed in an insulated container with ice. During the investigation, groundwater samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998[19] as summarised in the following table:

Table 6-2: Groundwater Sample Preservation and Storage

Analyte	Preservation	Storage
Heavy metals	45μm Filter, acidify with nitric acid to pH 1-2	Store at <4°, analysis within 30 days
VOCs (mid to heavy fraction TPH)	Zero headspace, teflon seal	Store at <4°, analysis within 7 days
VOCs (BTEX & light fraction TPH)	Zero headspace, Teflon seal, acidify with HCl to pH 1-2	Store at <4°, analysis within 7 days
OPP/OCP/PCB	Nil	Store at <4°, analysis within 7 days

Notes:
1 – Analysing the sample for pH within 6 hours is not practical in most situations. In order to account for this, a calibrated field pH meter is used during sampling.

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

6.4 Laboratory Analysis

The samples were analysed by the following laboratories:

Table 6-3: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples, intra-laboratory duplicates, trip blanks, trip spikes and field	Envirolab Services Pty Ltd, NATA Accreditation Number – 2901 (ISO/IEC17025 compliance)	86615, 86615-A, 86620, 114380 and 114380-A.

[19] *Water Quality – Part 1: Sampling, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples,* Standards Australia, 1998 (AS/NZS 5667.1:1998)

Samples	Laboratory	Report Reference
rinsate samples		
Inter-laboratory duplicates	National Measurement Institute (NMI), NATA Accreditation Number – 198	RN961074

Samples were analysed by the laboratories using the analytical methods detailed in Schedule B(3) of NEPM (2013). Reference should be made to the laboratory reports attached in Appendix B for further details.

6.5 Soil and Groundwater Analytical Schedule

The soil and groundwater analytical schedule is outlined in the following table:

Table 6-4: Laboratory Analytical Schedule

PCC	No. of Fill Soil Samples	No. of Natural Soil Samples	Groundwater Samples
Heavy Metals	27	11	2
TPH/BTEX	14	4	2
PAHs	14	4	2
OCPs	27	7	2
OPPs	26	7	2
PCBs	14	na	2
Asbestos	14	Na	Na

Note:
Na – Not analysed

An additional 19 fill soil samples were analysed for Toxicity characteristic leaching procedure (TCLP) and 6 fill soil samples for (Australian standard leaching procedure) ASLP.

7 INVESTIGATION RESULTS

7.1 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 Appendix A for further details.

Table 7-1: Summary of Subsurface Conditions

Profile	Description[1]
Pavement	Asphaltic pavement approximately 0.3m thick was encountered in BH107.
Fill	Fill was encountered from the surface in all the boreholes (except BH107) and extended to depths of approximately 0.15m to 0.8m. Boreholes BH204 and BH205 were terminated in the fill due to hand auger refusal. The fill comprised of: silty sandy gravel; gravelly silty sand; sandy silty gravel; silty sand; gravelly clayey sand; and silty clay. The fill contained inclusions of: fine to medium grained quartz, ironstone, sandstone and igneous gravel; trace of ash and slag; glass and concrete fragments; sand; and root fibres.
Natural Soil	Residual silty clay natural soil was encountered beneath the fill in the majority of the boreholes drilled for the assessment. The natural soil extended to the termination depth of the JK boreholes to a depth of approximately 9.4m. The silty clay was medium to high plasticity and contained inclusions of root fibres, ash and ironstone gravel.
Groundwater	Groundwater seepage was measured up to 5hrs after completion of drilling. Groundwater was encountered at various depths in all boreholes with the exception of BH106 which remained dry on completion of drilling. Temporary groundwater monitoring wells were installed in boreholes BH101 and BH102. SWL was measured in the monitoring wells at 4.46mBGL and 3.24mBGL respectively.

Note:
1 – Metres below ground level

7.1.1 VOC Screening

The PID soil sample headspace readings were all 0ppm equivalent isobutylene indicating a lack of PID detectable volatile organic contaminants in the samples.

7.2 Soil Laboratory Results

The soil laboratory results are presented in Tables A to F attached to the report. The laboratory reports are presented in Appendix B. A summary of the results assessed against the SAC is presented below.

Table 7-2: Summary of Soil Laboratory Results

<table>
<tr><th>Analyte</th><th>Results Compared to SAC</th></tr>
<tr><td>Heavy Metals</td><td><u>HILs:</u>
Elevated concentrations of arsenic and lead were encountered above the HIL-B criteria as outlined below:
<table><tr><td></td><td></td><td></td><td colspan="2">SAC (mg/kg)</td></tr><tr><th>Sample</th><th>Depth</th><th>Description</th><th><u>Arsenic</u>
500</th><th><u>Lead</u>
1200</th></tr><tr><td>BH104</td><td>0.0-0.2</td><td>Fill</td><td>590</td><td>2300</td></tr><tr><td>BH111</td><td>0.0-0.5</td><td>Fill</td><td>700</td><td>-</td></tr><tr><td>BH111</td><td>0.05-0.1</td><td>Fill</td><td>570</td><td>-</td></tr><tr><td>BH114</td><td>0.2-0.4</td><td>Silty Clay / possibly fill</td><td>570</td><td>-</td></tr><tr><td>BH201</td><td>0.1-0.3</td><td>Fill</td><td>1600</td><td>-</td></tr><tr><td>BH204</td><td>0.1-0.3</td><td>Fill</td><td>1200</td><td>-</td></tr><tr><td>BH207</td><td>0.4-0.6</td><td>Fill</td><td>-</td><td>1600</td></tr><tr><td>BH211</td><td>0-0.1</td><td>Fill</td><td>-</td><td>2000</td></tr></table>
<u>EILs:</u>
Elevated concentrations of heavy metals were encountered above the EIL-UR&POS including:
• 17 arsenic results ranging from 110mg/kg to 1600mg/kg;
• 5 copper results ranging from 110mg/kg to 280mg/kg;
• 4 lead results ranging from 1100mg/kg to 2300mg/kg; and
• 3 zinc results ranging from 250mg/kg to 660mg/kg.

<u>WC:</u>
Seventeen (17) arsenic and eighteen (18) lead results were greater than the CT1 and SCC1 criteria. TCLP leachates were prepared from these samples and analysed for heavy metals. All results were less than the TCLP1 criteria.</td></tr>
<tr><td>TPH</td><td><u>HSLs:</u>
All TPH results were below the HSL-B criteria.

<u>ESLs:</u>
One result was above the acceptance criterion for the F3 fraction. All remaining TPH results were below the ESL-UR&POS criteria.

<u>WC:</u>
All TPH results were less than the relevant CT1 and SCC1 criteria.</td></tr>
</table>

Analyte	Results Compared to SAC
BTEX	**HSLs:** All BTEX results were below the HSL-B criteria. **ESLs:** All BTEX results were below the ESL-UR&POS criteria. **WC:** All BTEX results were less than the relevant CT1 and SCC1 criteria.
PAHs	**HILs:** All PAH results were below the HIL-B criteria. **HSLs:** All naphthalene results were below the HSL-B criteria. **ESLs:** All benzo(a)pyrene results were below the ESL-UR&POS criteria, **EILs:** All naphthalene results were below the EIL-UR&POS criteria. **WC:** All PAH results were less than the relevant CT1 and SCC1 criteria.
OCPs & OPPs	**HILs:** All OCP and OPP results were below the HIL-B criteria. **EILs:** All DDT results were below the EIL-UR&POS criteria. **WC:** All OCP and OPP results were less than the relevant CT1 and SCC1 criteria.
PCBs	**HILs:** All PCB results were below the HIL-B criterion. **WC:** All PCB results were less than the SCC1 criterion.
Asbestos	**PSI:** Asbestos was not detected in the samples analysed for the investigation.
ASLP Leachates	ASLP leachates were prepared on nine selected fill samples and analysed for arsenic and lead. The ASLP arsenic results ranged from 0.23mg/L to 9.3mg/L. The ASLP lead results ranged from 0.15mg/L to 4.2mg/L.

Note:
WC – Waste Classification Guidelines 2009

7.3 Groundwater Laboratory Results

The groundwater laboratory results are presented in Table G attached to the report. The laboratory reports are presented in Appendix B. A summary of the results assessed against the GILs is presented below.

Table 7-3: Summary of Groundwater Laboratory Results

Analyte	Number of Samples Analysed	Results Compared to GILs
Heavy Metals	2	Elevated concentrations of copper and zinc were encountered above the GILs in the groundwater samples.
TPH & BTEX	2	All results were below the GILs.
PAHs	2	All results were below the GILs.
OCPs	2	Elevated concentrations of Aldrin, Dieldrin and Endosulfan were encountered in the groundwater sample obtained from BH101.
OPPs	2	All results were below the GILs.
PCBs	2	All results were below the GILs.

8 QA/QC ASSESSMENT

The QA/QC assessment includes a review of the DQIs established for the investigation (see **Section 3.2**). A summary of the field QA/QC samples are outlined below:

Table 8-1: Field QA/QC Samples

Field QA/QC	Frequency	Sample Details
Intra-laboratory duplicates	3 x soil and 1 x groundwater	• Dup 1 is a soil duplicate of sample BH108 (0.2-0.4m) • Dup A is a soil duplicate of sample BH205 (0-0.2m) • Dup B is a soil duplicate of sample BH210 (0-0.1m) • Dup 1 is a water duplicate of sample MW101
Inter-laboratory duplicates	1 x soil	• Dup 3 is a soil duplicate of sample BH110 (0-0.1m)
Field blanks (FB)	X 1	FB1 (sand blank) (28.2.13)
Rinsate (RS)	X 1	RS1 is a field rinsate from the SPT decontamination process (28.2.13).
Trip Spike (TS)	X 1	TS1 (water) is a BTEX spike (28.2.13).

An assessment of the DQIs is summarised in the following table.

Table 8-2: Assessment of DQIs

Completeness
Data and documentation completeness was achieved through the following measures: • Chain of custody (COC) records were prepared for each batch of samples sent to the labs (see Appendix B); • Laboratory sample receipt information was reviewed for each batch (see Appendix B); • NATA registered laboratories were used for all analysis; • Visual observations and PID screening of samples was undertaken during the investigation as noted on the COC documents (see Appendix B); and • All samples were analysed for the PCC identified in **Section 2**.
Comparability
Data comparability was achieved through the following measures: • Similar sampling techniques were used during the investigation; • Appropriate preservation, storage and transport methods were adopted for all samples; and

- Consistent analysis techniques and reporting standards were adopted by the laboratories.

Representativeness

Data representativeness was achieved through the following measures:

- The sampling plan was optimised to obtain adequate coverage of sample locations; and
- The assessment included a representative coverage of analysis for PCC.

Precision

Intra-laboratory RPD Results:

The intra-laboratory soil RPD results are summarised in the attached tables. The results indicated that field precision was generally acceptable. The RPD values for a range of individual heavy metals were outside the acceptance criteria. Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. As both the primary and duplicate sample results were less than the SAC (HILs) these exceedences are not considered to have had an adverse impact on the data set as a whole.

The intra-laboratory groundwater RPD results indicated that field precision was acceptable.

Inter-laboratory RPD Results:

The inter-laboratory soil RPD results are summarised in Table G. The results indicated that field precision was generally acceptable. The RPD values for lead and nickel were outside the acceptance criteria. Where applicable, the higher duplicate value has been adopted as a conservative measure. Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices. The RPD exceedences are not considered to have had an adverse impact on the data set as a whole.

Accuracy

Accuracy was achieved through the following measures:

- Trained and qualified field staff were used for the investigation;
- Appropriate industry standard sampling equipment and decontamination procedures were adopted for the investigation as outlined in Appendix C;
- Sampling and screening equipment are routinely factory calibrated. An in-house calibration check was undertaken prior to using onsite. The calibration records are attached in Appendix D;
- Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation;
- The report was prepared generally in accordance with Reporting Guidelines 1997; and
- Envirolab report 86620 commented that the OCP (in water) PQL was raised due to interference from analytes other than those being tested in the sample.

Trip Spike Results:

The BTEX results for the trip spikes ranged from 88% to 96% and indicated that field preservation methods were appropriate.

Field Rinsate Results:
The field rinsate results did not identify any cross-contamination artefacts associated with sampling equipment. All results were below the PQL.

Field Blank Results:
The trip blank results were all less than the PQLs.

- Review of laboratory QA/QC data is summarised below:

Laboratory Duplicate RPD Results:
Laboratory duplicate RPD results for the soil/groundwater analysis were generally within the acceptance criteria adopted by the laboratory/laboratories. Envirolab report 86615 commented that the RPD acceptance criteria were exceeded for samples 86615-1 and 86615-19. Triplicate results were therefore issued.

Matrix Spike Recovery:
Matrix spike recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics.

Surrogate Spike Recovery:
Surrogate spike recovery concentrations were generally within the acceptable limits of 60-140% for organics and 10-140% for VOCs. Envirolab report 86615 commented that the arsenic surrogate concentration was not reported in soil sample 86615-3 due to the heterogeneous nature of the element/s in the sample. An acceptable LCS recovery was however obtained.

LCS recovery:
LCS recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics.

The DQIs adopted for this investigation (see **Section 3.2**) have been addressed.

9 DISCUSSION

9.1 Soil Contamination

Elevated concentrations of contaminants were encountered in the fill and natural soil samples above the health based SAC. A summary of the elevated results is presented in the table below:

Table 9-1: Summary of Soil Results above the health based SAC

Analyte	SAC (mg/kg)	No. of Samples Analysed	No. of Results above SAC	Maximum Concentration
Arsenic	400	37	6	1600
Lead	1200	37	3	2300

Note:
1. Data shown for HILs only

Due to the contaminants encountered in the fill the material at these locations is not considered suitable for re-use of site. The natural soil in the vicinity of BH114 was also found to contain elevated concentrations of arsenic and is therefore not considered to be suitable for re-use of site. Refer to **Section 9.3** for disposal options.

The source of the lead contamination was considered to be associated with the presence of ash/slag in the fill. The source of the arsenic contamination was considered to be associated the possible former use of insecticides.

The attached Figure 2 indicates the approximate extent of the contaminated area based on the data obtained from the site investigations.

EIS are of the opinion that the soil contamination issues at the site can be managed by implementation of a Remedial Action Plan (RAP).

9.2 Summary of Leachate Results

The TCLP acid leachate results indicate that the samples are not leaching in significant quantities under acidic conditions.

The ASLP water leachate results indicate that the arsenic and lead in the samples obtained from BH201, BH204 and BH207 retained concentrations greater than 1mg/L which could potentially leach. We note that these boreholes are located in the impacted area as indicated on Figure 2 and are to be excavated and removed from site as part of the proposed development.

9.2.1 EILs

The majority of the fill samples encountered arsenic concentrations above the EIL. Copper, lead and zinc were also present at concentrations above the EILs.

We note that the EIL criteria are principally concerned with phytotoxicity (i.e. adverse effects on plant growth in established and proposed areas of landscaping).

We do not consider that these elevated EIL results will necessarily affect the proposed landscaping works for the following reasons:

- There are no known endangered ecologies species/communities currently existing at the site;
- The site in its current conditions does not show any signs of phytotoxic stress;
- The soil impacted by higher concentrations of arsenic and lead that may potentially leach are located in the area of the site that is to be excavated and disposed off-site as part of the proposed basement excavation; and
- We understand that the proposed new landscaping works will not include the use of any sensitive plant species.

9.3 Waste Classification

9.3.1 Classification of Fill Soil for Off-Site Disposal

The waste classification for the fill material is summarised in the following table:

Table 9-2: Waste Classification of Fill

Extent	Classification	Disposal Option
Fill material over the entire site And The natural soil in vicinity of BH114 that has been impacted by arsenic and lead	General Solid Waste (non-putrescible) (GSW)	The fill material classified under the GAI can only be disposed of to a NSW EPA licensed landfill capable of receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation.

Note:
1. Waste Classification Guidelines 2009

The fill material must be disposed of to a NSW EPA licensed facility. It is the responsibility of the receiving facility to ensure that the material meets their EPA license conditions. EIS accepts no liability whatsoever for illegal or inappropriate disposal of excavated material.

9.3.2 Classification of Natural Soil and Bedrock for Off-Site Disposal

The waste classification for the natural material is summarised in the following table:

Table 9-3: Waste Classification of Natural Material

Extent	Classification	Disposal Option
Natural silty clay soil and sandstone bedrock over the entire site with the exception of the natural material in the vicinity of BH114	Virgin excavated natural material (VENM)	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. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream. The VENM will have to be validated after removal of the fill material.

Material classed as VENM must not be mixed with any fill material (including building rubble) as this will invalidate the VENM classification. Where doubt exists about the difference between fill and VENM material an environmental/geotechnical engineer should be contacted.

9.4 Groundwater Contamination

Elevated concentrations of individual metals and Organochlorine pesticides (OCPs) were encountered in the groundwater sample obtained at the down-gradient section of the site (borehole BH101).

Table 9-4: Summary of Groundwater Results above the GILs

Analyte	GIL (µg/L)	No. of Samples Analysed	No. of Results above GIL	Maximum Concentration
Copper	1.4	2	1	2
Zinc	8	2	2	63
Aldrin	0.001	2	1	0.03
Dieldrin	0.01	2	1	0.04
Endosulfan	0.03	2	1	0.58

The elevated copper and zinc concentrations in the groundwater were not considered to be significant and are most likely a regional issue associated with surface water infiltration and leaking water infra-structure. This assumption in based on the condition of groundwater commonly encountered in urban areas and the presence of these metals in both the up-gradient and down-gradient wells.

The OCPs are considered to be a site specific contamination issue. This assumption is based on the understanding of past activities at the site, the absence of pesticides within the up-gradient well sample and the presence of trace levels of OCPs within the fill soil.

We would recommend some additional groundwater analysis prior to site works commencing to check whether the pesticide issue is a true reflection of the groundwater condition.

Based on the depth of groundwater encountered during the site investigation (ranging from 1.6m to 6.9m), groundwater is very likely to be intercepted during excavation works and dewatering will be required. Interim groundwater management will include (but not be limited to) the following:

- Council and other relevant approvals will be required prior to disposal of groundwater into the stormwater system; and
- Set-up of a site specific groundwater treatment and de-watering plant by a specialised contractor.

The interim management of groundwater contamination issues at the site can be facilitated via a Remedial Action Plan.

The long-term management of groundwater contamination issues at the site can be facilitated via an Environmental Management Plan.

9.5 Assessment of Risk

Table 9-5: Risk Matrix

Receptor	Potential Exposure Pathway of Contaminants	Risk Category	Recommendations
Human receptors	a). Direct contact with contaminated soil can lead to dermal absorption or ingestion b). On-site usage and consumption of contaminated groundwater d). Off-site usage and consumption of contaminated groundwater	Moderate	A remedial action plan (RAP) should be prepared for the site. Following removal of the contaminated soil the risk humans coming into contact with contaminated soil would be very low. Site workers involved in the proposed development should be made aware of the contamination by preparing a WHS plan outlining the PPE and other procedures required for undertaking work. OC pesticides may migrate off-site with groundwater flow. The potential for human consumption of groundwater is considered to be low. The

Receptor	Potential Exposure Pathway of Contaminants	Risk Category	Recommendations
			groundwater bore search did not indicate the present of bores registered for domestic use in the immediate vicinity of the site. The surrounding area is connected to potable water and the risk of bore water being used for human consumption is very low.
Environmental receptors	a). Uptake of contaminants by sensitive plant species b). Uptake of contaminants by sensitive fauna c). Migration of contaminants dissolved in groundwater.	Low to Moderate	The risk associated with sensitive environmental receptors coming into contact with contaminated soil will be very low following removal of the contaminated soil. Further investigation is required to assess the risk associated with the pesticide contaminated groundwater.

10 CONCLUSION

EIS consider that the objectives of this ESA (detailed in **Section 1.2**) and the DQOs (detailed in **Section 3**) have generally been addressed.

Based on the scope of work undertaken, EIS consider that the site can be made suitable for the proposed development provided a remedial Action Plan (RAP) is prepared for the site to in order to outline the remediation and validation works.

10.1 Regulatory Requirement

The regulatory requirements applicable for the site are outlined in the following table:

Table 10-1: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2008[20]	The requirement to notify the NSW EPA regarding site contamination should be assessed once the results of the additional investigation work have been reviewed and a remedial strategy has been selected. Please note that in the event the recommendations for additional work and remediation are not undertaken, there may be justification to notify the EPA. EIS can be contacted for further advice regarding notification.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.

[20] *Guidelines on the Duty to Report Contamination*, NSW Government Legislation, 2008 (Duty to Report Contamination 2008)

11 LIMITATIONS

The sampling locations for the investigation have enabled an assessment to be made of the risk of the existence of significant, large quantities of contamination.

EIS adopts no responsibility whatsoever for any problems such as underground storage tanks, buried items or contaminated material that may be encountered between sampling locations at the site. Development activities at the site should be planned on this basis, and any unexpected problems that may be encountered between sampling locations should be immediately inspected by experienced environmental personnel. This should ensure that such problems are dealt with in an appropriate manner, with minimal disruption to the project timetable and budget.

The conclusions developed in this report are based on site conditions which existed at the time of the investigation and the scope of work outlined in the report. They are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, and visual observations of the site and immediate surrounds, together with the interpretation of available historical information and documents reviewed as described in this report.

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 previously in this 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.

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.

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.

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.

Changes in the proposed or current site use may result in remediation or further investigation being required at the site.

During construction at the site, soil, fill and any unsuspected materials that are encountered should be monitored by qualified environmental and geotechnical engineers to confirm assumptions made on the basis of the limited investigation data, and possible changes in site level and other conditions since the investigation. Soil materials considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa.

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. Copyright in this report is the property of EIS. EIS has used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report.

LIST OF IN-TEXT TABLES:

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 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 (eg. 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.

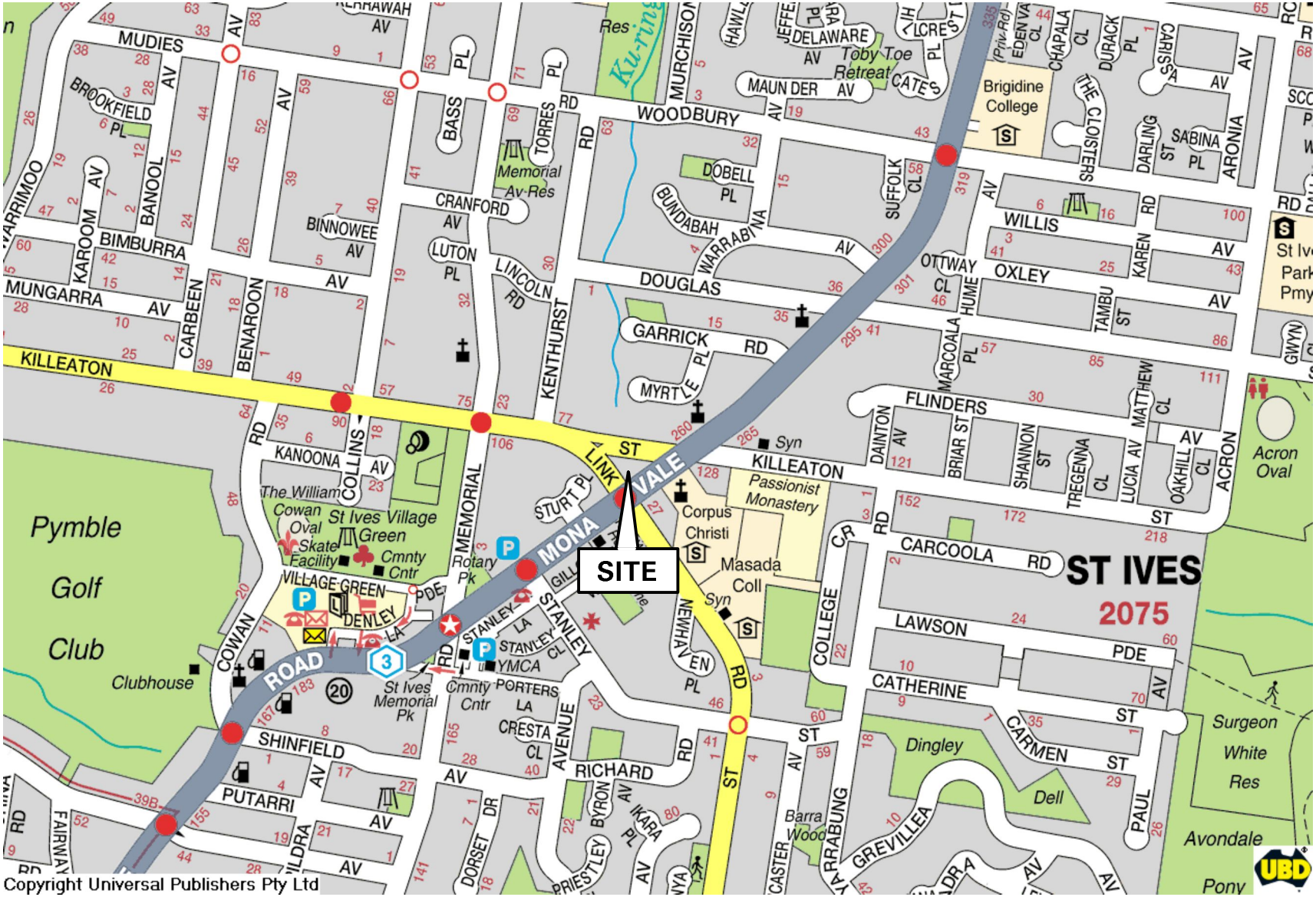
Misinterpretation of Site Assessments by Design Professionals
Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with 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 problems, 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 test 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

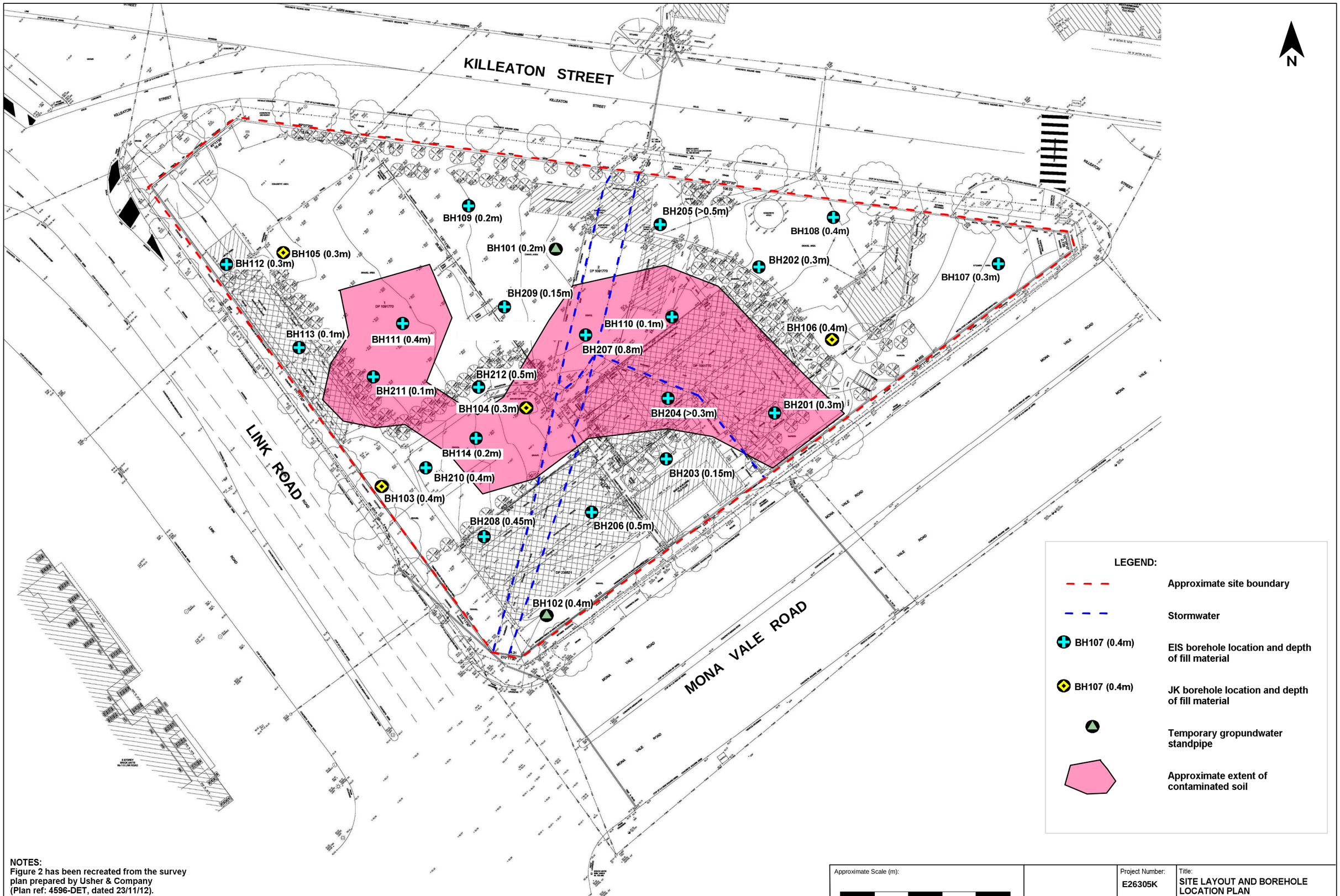


NOTES:
Figure 1 has been recreated from UBD on disc (version 5.0). Figure is not to scale.

UBD Map ref: 155 B11

Reference should be made to the report text for a full understanding of this plan.

ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E26305K	Title: SITE LOCATION PLAN
	Figure: 1	Address: 238 MONA VALE ROAD ST IVES NSW 2075



NOTES:
Figure 2 has been recreated from the survey plan prepared by Usher & Company (Plan ref: 4596-DET, dated 23/11/12).

Reference should be made to the report text for a full understanding of this plan.

Approximate Scale (m): 0 5 10 15 20 25	ENVIRONMENTAL INVESTIGATION SERVICES	Project Number: E26305K	Title: SITE LAYOUT AND BOREHOLE LOCATION PLAN
		Figure: 2	Address: 238 MONA VALE ROAD ST IVES NSW 2075

TABLES WITH ANALYTICAL RESULTS

EIS

TABLE A
SOIL LABORATORY RESULTS COMPARED TO HILs
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 [2]	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P TEQ [3]	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) [1]			500	150	500	30000	1200	120	1200	60000	400	4	15	400	500	10	90	600	10	340	1	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH101	0.0-0.1	Fill	240	LPQL	18	84	140	LPQL	9	190	0.08	LPQL	LPQL	0.8	LPQL	LPQL	LPQL	1.4	LPQL	LPQL	LPQL	Not detected
BH102	0.0-0.1	Fill	38	LPQL	33	2	38	LPQL	5	7	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH103	0.0-0.2	Fill	360	LPQL	6	7	16	LPQL	4	90	LPQL	LPQL	LPQL	LPQL	LPQL	0.5	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH104	0.0-0.2	Fill	**590**	LPQL	10	24	**2300**	LPQL	4	72	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1	LPQL	LPQL	LPQL	Not detected
BH104	0.5-0.95	Silty Clay	20	LPQL	32	2	68	LPQL	2	4	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH105	0.0-0.2	Fill	18	LPQL	16	19	180	LPQL	3	27	0.06	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1	LPQL	LPQL	LPQL	Not detected
BH105	0.5-0.95	Silty Clay	14	LPQL	35	3	28	LPQL	2	5	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH106	0.0-0.2	Fill	47	LPQL	14	15	930	LPQL	6	71	LPQL	LPQL	LPQL	LPQL	LPQL	2.8	LPQL	0.2	LPQL	LPQL	LPQL	Not detected
BH107	0.1-0.3	Fill	58	LPQL	24	14	510	LPQL	22	660	0.05	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH109	0.0-0.2	Fill	80	LPQL	19	11	110	LPQL	6	71	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	LPQL	Not detected
BH110	0.0-0.1	Fill	260	LPQL	20	22	110	LPQL	7	53	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH111	0.0-0.5	Fill	**700**	LPQL	20	230	100	0.2	5	250	0.27	LPQL	LPQL	1.5	LPQL	LPQL	LPQL	0.7	LPQL	LPQL	LPQL	Not detected
BH111	0.05-0.1	Fill	**570**	LPQL	21	280	450	LPQL	8	190	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH111	0.4-0.6	Silty Clay	400	LPQL	18	170	45	LPQL	3	57	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	LPQL	LPQL	Not detected
BH112	0.0-0.05	Fill	4	LPQL	39	LPQL	13	LPQL	3	3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	1.2	LPQL	NA	NA	NA
BH114	0.0-0.1	Fill	71	0.5	12	110	140	LPQL	12	300	2.07	LPQL	0.6	LPQL	LPQL	0.2	LPQL	1	LPQL	LPQL	LPQL	Not detected
BH114	0.2-0.4	Silty Clay / possibly fill	**570**	LPQL	20	160	1100	0.1	6	110	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	NA	LPQL	LPQL	Not detected
BH201	0.1-0.3	Fill	**1600**	LPQL	33	1	18	LPQL	3	58	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH202	0-0.2	Fill	110	NA	NA	NA	880	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	0.1	LPQL	NA	NA	NA
BH203	0-0.15	Fill	30	NA	NA	NA	110	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH203	0.2-0.4	Silty Clay	10	NA	NA	NA	24	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH204	0.1-0.3	Fill	**1200**	NA	NA	NA	49	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH205	0-0.2	Fill	10	NA	NA	NA	280	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH206	0-0.15	Fill	130	NA	NA	NA	94	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH206	0.6-0.8	Silty Clay	4	NA	NA	NA	37	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH207	0.4-0.6	Fill	170	NA	NA	NA	**1600**	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH207	0.8-1.0	Silty Clay	60	NA	NA	NA	36	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH208	0-0.15	Fill	150	NA	NA	NA	270	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH208	0.5-0.7	Silty Clay	LPQL	NA	NA	NA	98	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH209	0-0.15	Fill	120	NA	NA	NA	180	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	0.3	LPQL	NA	NA	NA
BH209	0.2-0.4	Silty Clay	20	NA	NA	NA	13	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH210	0-0.1	Fill	220	NA	NA	NA	340	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	0.1	LPQL	1	LPQL	NA	NA	NA
BH210	0.5-0.7	Fill	8	NA	NA	NA	28	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH211	0-0.1	Fill	370	NA	NA	NA	**2000**	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	0.1	LPQL	NA	NA	NA
BH211	0.2-0.4	Silty Clay	4	NA	NA	NA	20	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
BH212	0.2-0.4	Fill	LPQL	NA	NA	NA	79	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	3	LPQL	NA	NA	NA
BH212	0.6-0.8	Silty Clay	79	NA	NA	NA	9	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA	NA	NA
																					NA	
Total Number of Samples			37	18	18	18	37	18	18	18	18	18	33	33	33	33	33	34	33	13	14	14
Maximum Value			1600	0.5	39	280	2300	0.2	22	660	2.07	LPQL	0.6	1.5	LPQL	2.8	LPQL	3	LPQL	LPQL	LPQL	NC

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-B: 'Residential with minimal opportunities for soil access; including dwellings with fully/permanently paved yards like high-rise buildings'

2 - The 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.

3 - B(a)P TEQ - Benzo(a)pyrene Toxicity Equivalence Quotient has been calculated based on 8 carcinogenic PAHs and their Toxic Equivalence Factors (TEFs) outlined in NEPM 2013

Concentration above the SAC **VALUE**

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
HILs: Health Investigation Levels
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure

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	PID [2]
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1	
HSL Land Use Category [1]					**HIGH DENSITY RESIDENTIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH101	0.0-0.1	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH102	0.0-0.1	Fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH103	0.0-0.2	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH104	0.0-0.2	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH104	0.5-0.95	Silty Clay	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH105	0.0-0.2	Fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH105	0.5-0.95	Silty Clay	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH106	0.0-0.2	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH107	0.1-0.3	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH109	0.0-0.2	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH110	0.0-0.1	Fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH111	0.0-0.5	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH111	0.05-0.1	Fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH111	0.4-0.6	Silty Clay	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH112	0.0-0.05	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH114	0.0-0.1	Fill	0m to < 1m	Sand	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH114	0.2-0.4	Silty Clay / possibly fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH201	0.1-0.3	Fill	0m to < 1m	Clay	*LPQL*	*LPQL*	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH202	0-0.2	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH203	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH203	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH204	0.1-0.3	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH205	0-0.2	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH206	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH206	0.6-0.8	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH207	0.4-0.6	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH207	0.8-1.0	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH208	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH208	0.5-0.7	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH209	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH209	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH210	0-0.1	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH210	0.5-0.7	Fill	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH211	0-0.1	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH211	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
BH212	0.2-0.4	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA	0
BH212	0.6-0.8	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA	0
Total Number of Samples					18	18	18	18	18	18	18	37
Maximum Value					LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013
2 - Field PID values obtained during the investigation
Values shown in blue are for the pre-2013 hydrocarbon fractions
Concentration above the SAC **VALUE**
The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

Abbreviations:

UCL: Upper Level Confidence Limit on Mean Value	NC: Not Calculated	PQL: Practical Quantitation Limit	UCL: Upper Level Confidence Limit on Mean Value
HSLs: Health Screening Levels	NL: Not Limiting	LPQL: Less than PQL	HILs: Health Investigation Levels
NA: Not Analysed	na: Not Analysed	SAC: Site Assessment Criteria	NEPM: National Environmental Protection Measure

SITE ASSESSMENT CRITERIA

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1
HSL Land Use Category [1]					**HIGH DENSITY RESIDENTIAL**						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH101	0.0-0.1	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH102	0.0-0.1	Fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH103	0.0-0.2	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH104	0.0-0.2	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH104	0.5-0.95	Silty Clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH105	0.0-0.2	Fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH105	0.5-0.95	Silty Clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH106	0.0-0.2	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH107	0.1-0.3	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH109	0.0-0.2	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH110	0.0-0.1	Fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH111	0.0-0.5	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH111	0.05-0.1	Fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH111	0.4-0.6	Silty Clay	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH112	0.0-0.05	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH114	0.0-0.1	Fill	0m to < 1m	Sand	45	110	0.5	160	55	40	3
BH114	0.2-0.4	Silty Clay / possibly fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH201	0.1-0.3	Fill	0m to < 1m	Clay	50	280	0.7	480	NL	110	5
BH202	0-0.2	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH203	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH203	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH204	0.1-0.3	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH205	0-0.2	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH206	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH206	0.6-0.8	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH207	0.4-0.6	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH207	0.8-1.0	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH208	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH208	0.5-0.7	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.15	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH209	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH210	0-0.1	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH210	0.5-0.7	Fill	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH211	0-0.1	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH211	0.2-0.4	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA
BH212	0.2-0.4	Fill	0m to < 1m	Sand	NA	NA	NA	NA	NA	NA	NA
BH212	0.6-0.8	Silty Clay	0m to < 1m	Clay	NA	NA	NA	NA	NA	NA	NA

EIS

TABLE C
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES (2009)
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[2]	Total Scheduled[3]	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 [1]			100	20	100	NSL	100	4	40	NSL	NSL	0.8	60	4	NSL	NSL	NSL	NSL		NSL		NSL	10	288	600	1000	-
General Solid Waste SCC1 [1]			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	50	50	650		NSL		10000	18	518	1080	1800	-
Restricted Solid Waste CT2 [1]			400	80	400	NSL	400	16	160	NSL	NSL	3.2	240	16	NSL	NSL	NSL	NSL		NSL		NSL	40	1152	2400	4000	-
Restricted Solid Waste SCC2 [1]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	50	50	2600		NSL		40000	72	2073	4320	7200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH101	0.0-0.1	Fill	240	LPQL	18	84	140	LPQL	9	190	0.08	0.08	0.8	LPQL	LPQL	1.4	LPQL	LPQL	LPQL	LPQL	150	150	LPQL	LPQL	LPQL	LPQL	Not detected
BH102	0.0-0.1	Fill	38	LPQL	33	2	38	LPQL	5	7	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH103	0.0-0.2	Fill	360	LPQL	6	7	16	LPQL	4	90	LPQL	LPQL	LPQL	LPQL	LPQL	0.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH104	0.0-0.2	Fill	590	LPQL	10	24	2300	LPQL	4	72	LPQL	LPQL	LPQL	LPQL	LPQL	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH104	0.5-0.95	Silty Clay	20	LPQL	32	2	68	LPQL	2	4	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH105	0.0-0.2	Fill	18	LPQL	16	19	180	LPQL	3	27	0.06	0.06	LPQL	LPQL	LPQL	0.3	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH105	0.5-0.95	Silty Clay	14	LPQL	35	3	28	LPQL	2	5	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH106	0.0-0.2	Fill	47	LPQL	14	15	930	LPQL	6	71	LPQL	LPQL	LPQL	LPQL	LPQL	3.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH107	0.1-0.3	Fill	58	LPQL	24	14	510	LPQL	22	660	0.05	0.05	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH109	0.0-0.2	Fill	80	LPQL	19	11	110	LPQL	6	71	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH110	0.0-0.1	Fill	260	LPQL	20	22	110	LPQL	7	53	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH111	0.0-0.5	Fill	700	LPQL	20	230	100	0.2	5	250	0.27	0.07	1.5	LPQL	LPQL	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH111	0.05-0.1	Fill	570	LPQL	21	280	450	LPQL	8	190	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH111	0.4-0.6	Silty Clay	400	LPQL	18	170	45	LPQL	3	57	LPQL	LPQL	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH112	0.0-0.05	Fill	4	LPQL	39	LPQL	13	LPQL	3	3	LPQL	LPQL	LPQL	LPQL	LPQL	1.8	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH114	0.0-0.1	Fill	71	0.5	12	110	140	LPQL	12	300	2.07	0.07	LPQL	LPQL	LPQL	1.2	LPQL	LPQL	LPQL	310	490	800	LPQL	LPQL	LPQL	LPQL	Not detected
BH114	0.2-0.4	Silty Clay / possibly fill	570	LPQL	20	160	1100	0.1	6	110	LPQL	LPQL	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not detected
BH201	0.1-0.3	Fill	1600	LPQL	33	1	18	LPQL	3	58	LPQL	LPQL	LPQL	NA	NA	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH202	0-0.2	Fill	110	NA	NA	NA	880	NA	NA	NA	NA	NA	LPQL	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0-0.15	Fill	30	NA	NA	NA	110	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.2-0.4	Silty Clay	10	NA	NA	NA	24	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH204	0.1-0.3	Fill	1200	NA	NA	NA	49	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH205	0-0.2	Fill	10	NA	NA	NA	280	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH206	0-0.15	Fill	130	NA	NA	NA	94	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH206	0.6-0.8	Silty Clay	4	NA	NA	NA	37	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	0.4-0.6	Fill	170	NA	NA	NA	1600	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	0.8-1.0	Silty Clay	60	NA	NA	NA	36	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH208	0-0.15	Fill	150	NA	NA	NA	270	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH208	0.5-0.7	Silty Clay	LPQL	NA	NA	NA	98	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.15	Fill	120	NA	NA	NA	180	NA	NA	NA	NA	NA	LPQL	NA	NA	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0.2-0.4	Silty Clay	20	NA	NA	NA	13	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0-0.1	Fill	220	NA	NA	NA	340	NA	NA	NA	NA	NA	LPQL	NA	NA	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0.5-0.7	Fill	8	NA	NA	NA	28	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH211	0-0.1	Fill	370	NA	NA	NA	2000	NA	NA	NA	NA	NA	LPQL	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH211	0.2-0.4	Silty Clay	4	NA	NA	NA	20	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH212	0.2-0.4	Fill	LPQL	NA	NA	NA	79	NA	NA	NA	NA	NA	LPQL	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH212	0.6-0.8	Silty Clay	79	NA	NA	NA	9	NA	NA	NA	NA	NA	LPQL	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of samples			37	18	18	18	37	18	18	18	18	18	33	13	13	33	14	18	18	18	18	18	18	18	18	18	0
Maximum Value			1600	0.5	39	280	2300	0.2	22	660	2.07	0.08	1.5	LPQL	LPQL	3.2	LPQL	LPQL	LPQL	310	490	800	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

[1] - NSW DECCW Waste Classification Guidelines (2009)

[2] - Assessment of Total moderately harmful pesticides includes: Dimethoate, Fenitrothion, Ethion

[3] - Assessment of Total scheduled pesticides include: alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde

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

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
BTEX: Monocyclic Aromatic Hydrocarbons
UCL: Upper Level Confidence Limit on Mean Value
ALPQL: All values less than PQL
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
TRH: Total Recoverable Hydrocarbons
CT: Contaminant Threshold
SCC: Specific Contaminant Concentration
HILs: Health Investigation Levels
NEPM: National Environmental Protection Measure

TABLE D
SOIL LABORATORY TCLP RESULTS
All data in mg/L unless stated otherwise

			Arsenic	Lead
PQL - Envirolab Services			0.05	0.03
TCLP1 - General Solid Waste [1]			5	5
TCLP2 - Restricted Solid Waste [1]			20	20
TCLP3 - Hazardous Waste [1]			>20	>20
Sample Reference	**Sample Depth**	**Sample Description**		
BH101	0.0-0.1	Fill	0.3	0.07
BH103	0.0-0.2	Fill	0.2	NA
BH104	0.0-0.2	Fill	1	2.8
BH105	0.0-0.2	Fill	NA	0.2
BH106	0.0-0.2	Fill	NA	1.6
BH107	0.1-0.3	Fill	NA	0.7
BH109	0.0-0.2	Fill	0.7	0.03
BH110	0.0-0.1	Fill	1.1	NA
BH111	0.0-0.5	Fill	0.4	0.2
BH111	0.05-0.1	Fill	0.6	NA
BH112	0.0-0.05	Fill	NA	0.05
BH114	0.0-0.1	Fill	0.4	0.6
BH114	0.2-0.4	Fill	1.9	NA
BH201	0.1-0.3	Fill	NA	0.3
BH202	0-0.2	Fill	0.3	0.3
BH204	0.1-0.3	Fill	NA	1.7
BH207	0.4-0.6	Fill	1.7	NA
BH210	0-0.1	Fill	NA	NA
BH211	0-0.1	Fill	3.8	0.4
Total Number of samples			12	13
Maximum Value			3.8	2.8

Explanation:

1 - NSW DECCW Waste Classification Guidelines (2009)

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)pyrene
NC: Not Calculated
NA: Not Analysed
TCLP: Toxicity Characteristics Leaching Procedure

TABLE E
SOIL LABORATORY ASLP RESULTS
All data in mg/L unless stated otherwise

			Arsenic	Lead
PQL - Envirolab Services			1	1
Sample Reference	**Sample Depth**	**Sample Description**		
BH201	0.1-0.3	Fill	1.6	NA
BH202	0-0.2	Fill	0.23	0.4
BH204	0.1-0.3	Fill	9.3	NA
BH207	0.4-0.6	Fill	NA	4.2
BH210	0-0.1	Fill	0.3	0.15
BH211	0-0.1	Fill	0.41	0.83
Total Number of samples			5	4
Maximum Value			9.3	4.2

Abbreviations:
PQL: Practical Quantitation Limit
LPQL: Less than PQL
B(a)P: Benzo(a)pyrene
NC: Not Calculated
NA: Not Analysed
TCLP: Toxicity Characteristics Leaching Procedure

EIS

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

Land Use Category [1]				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) [2]				-	-	-	NSL	13	28	NSL	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH101	0.0-0.1	Fill	Coarse	NA	NA	NA	240	18	84	140	9	190	LPQL	0.2	LPQL	LPQL	160	LPQL	LPQL	LPQL	LPQL	LPQL	0.08
BH102	0.0-0.1	Fill	Fine	NA	NA	NA	38	33	2	38	5	7	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH103	0.0-0.2	Fill	Coarse	NA	NA	NA	360	6	7	16	4	90	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH104	0.0-0.2	Fill	Coarse	NA	NA	NA	590	10	24	2300	4	72	LPQL	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH104	0.5-0.95	Silty Clay	Fine	NA	NA	NA	20	32	2	68	2	4	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH105	0.0-0.2	Fill	Fine	NA	NA	NA	18	16	19	180	3	27	LPQL	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.06
BH105	0.5-0.95	Silty Clay	Fine	NA	NA	NA	14	35	3	28	2	5	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH106	0.0-0.2	Fill	Coarse	NA	NA	NA	47	14	15	930	6	71	LPQL	0.1	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH107	0.1-0.3	Fill	Coarse	NA	NA	NA	58	24	14	510	22	660	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.05
BH109	0.0-0.2	Fill	Coarse	NA	NA	NA	80	19	11	110	6	71	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH110	0.0-0.1	Fill	Fine	NA	NA	NA	260	20	22	110	7	53	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.07
BH111	0.0-0.5	Fill	Coarse	NA	NA	NA	700	20	230	100	5	250	LPQL	0.2	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH111	0.05-0.1	Fill	Coarse	NA	NA	NA	570	21	280	450	8	190	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH111	0.4-0.6	Silty Clay	Fine	NA	NA	NA	400	18	170	45	3	57	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH112	0.0-0.05	Fill	Coarse	NA	NA	NA	4	39	LPQL	13	3	3	LPQL	0.6	LPQL	LPQL	660	230	LPQL	LPQL	LPQL	LPQL	0.07
BH114	0.0-0.1	Fill	Coarse	NA	NA	NA	71	12	110	140	12	300	LPQL	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH114	0.2-0.4	Silty Clay / possibly fill	Fine	NA	NA	NA	570	20	160	1100	6	110	LPQL	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL
BH201	0.1-0.3	Fill	Coarse	NA	NA	NA	1600	33	1	18	3	58	LPQL	LPQL	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	NA
BH202	0-0.2	Fill	Coarse	NA	NA	NA	110	NA	NA	880	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0-0.15	Fill	Coarse	NA	NA	NA	30	NA	NA	110	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH203	0.2-0.4	Silty Clay	Fine	NA	NA	NA	10	NA	NA	24	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH204	0.1-0.3	Fill	Coarse	NA	NA	NA	1200	NA	NA	49	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH205	0-0.2	Fill	Coarse	NA	NA	NA	10	NA	NA	280	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH206	0-0.15	Fill	Coarse	NA	NA	NA	130	NA	NA	94	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH206	0.6-0.8	Silty Clay	Fine	NA	NA	NA	4	NA	NA	37	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	0.4-0.6	Fill	Fine	NA	NA	NA	170	NA	NA	1600	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH207	0.8-1.0	Silty Clay	Fine	NA	NA	NA	60	NA	NA	36	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH208	0-0.15	Fill	Coarse	NA	NA	NA	150	NA	NA	270	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH208	0.5-0.7	Silty Clay	Fine	NA	NA	NA	LPQL	NA	NA	98	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0-0.15	Fill	Coarse	NA	NA	NA	120	NA	NA	180	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH209	0.2-0.4	Silty Clay	Fine	NA	NA	NA	20	NA	NA	13	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0-0.1	Fill	Coarse	NA	NA	NA	220	NA	NA	340	NA	NA	NA	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH210	0.5-0.7	Fill	Fine	NA	NA	NA	8	NA	NA	28	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH211	0-0.1	Fill	Coarse	NA	NA	NA	370	NA	NA	2000	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH211	0.2-0.4	Silty Clay	Fine	NA	NA	NA	4	NA	NA	20	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH212	0.2-0.4	Fill	Coarse	NA	NA	NA	LPQL	NA	NA	79	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH212	0.6-0.8	Silty Clay	Fine	NA	NA	NA	79	NA	NA	9	NA	NA	NA	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number of Samples				0	0	0	37	18	18	37	18	18	18	33	17	17	17	17	18	18	18	18	17
Maximum Value				NC	NC	NC	1600	39	280	2300	22	660	LPQL	0.6	LPQL	LPQL	660	230	LPQL	LPQL	LPQL	LPQL	0.08

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013
2 - ABC Values for selected metals has 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)

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

Abbreviations:

EILs: Ecological Investigation Levels
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
UCL: Upper Level Confidence Limit on Mean Value
ESLs: Ecological Screening Levels
NA: Not Analysed
LPQL: Less than PQL
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure
NC: Not Calculated
NSL: No Set Limit
ABC: Ambient Background Concentration

EIL AND ESL ASSESSMENT CRITERIA

Land Use Category [1]				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) [2]				-	-	-	NSL	13	28	NSL	5	122	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL	NSL
Sample Reference	**Sample Depth**	**Sample Description**	**Soil Texture**																				
BH101	0.0-0.1	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH102	0.0-0.1	Fill	Fine	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	1300	5600	60	105	125	45	0.7
BH103	0.0-0.2	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH104	0.0-0.2	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH104	0.5-0.95	Silty Clay	Fine	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	1300	5600	60	105	125	45	0.7
BH105	0.0-0.2	Fill	Fine	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	1300	5600	60	105	125	45	0.7
BH105	0.5-0.95	Silty Clay	Fine	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	1300	5600	60	105	125	45	0.7
BH106	0.0-0.2	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH107	0.1-0.3	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH109	0.0-0.2	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH110	0.0-0.1	Fill	Fine	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	1300	5600	60	105	125	45	0.7
BH111	0.0-0.5	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH111	0.05-0.1	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH111	0.4-0.6	Silty Clay	Fine	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	1300	5600	60	105	125	45	0.7
BH112	0.0-0.05	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH114	0.0-0.1	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	180	120	300	2800	50	85	70	105	0.7
BH114	0.2-0.4	Silty Clay / possibly fill	Fine	NA	NA	NA	100	203	88	1100	35	192	710	--	180	120	1300	5600	60	105	125	45	0.7
BH201	0.1-0.3	Fill	Coarse	NA	NA	NA	100	203	88	1100	35	192	710	180	--	--	--	--	50	85	70	105	--
BH202	0-0.2	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH203	0-0.15	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH203	0.2-0.4	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH204	0.1-0.3	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH205	0-0.2	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH206	0-0.15	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH206	0.6-0.8	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH207	0.4-0.6	Fill	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH207	0.8-1.0	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH208	0-0.15	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH208	0.5-0.7	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH209	0-0.15	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH209	0.2-0.4	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH210	0-0.1	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH210	0.5-0.7	Fill	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH211	0-0.1	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH211	0.2-0.4	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH212	0.2-0.4	Fill	Coarse	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--
BH212	0.6-0.8	Silty Clay	Fine	NA	NA	NA	100	--	--	1100	--	--	--	180	--	--	--	--	--	--	--	--	--

TABLE G
SUMMARY OF GROUNDAWATER LABORATORY RESULTS
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	GIL - ANZECC 2000 [1] Fresh Waters	GIL - US EPA [5]	Samples	
				MW101	MW102
Inorganic Compounds and Parameters					
pH	0.1	6.5 - 8.5[i]	-	5.8	5.7
Electrical Conductivity (µS/cm)	1	nsl	-	230	180
Hardness (mgCaCo3/L)	3	nsl	-	42	20
Heavy Metals					
Arsenic (As III)	1	24	-	3	LPQL
Cadmium	0.1	0.2	-	0.2	LPQL
Chromium (III)	1	3.3[a]	-	3	1
Copper	1	1.4	-	**2**	1
Lead	1	3.4	-	LPQL	LPQL
Mercury (inorganic)	0.05	0.6	-	LPQL	LPQL
Nickel	1	11	-	3	1
Zinc	1	8	-	**63**	**35**
Petroleum Hydrocarbons (TPH Compounds)					
Hydrocarbons C6-C9	10	nsl	-	LPQL	LPQL
Hydrocarbons C10-C14	50	nsl	-	LPQL	LPQL
Hydrocarbons C15-C28	100	nsl	-	LPQL	LPQL
Hydrocarbons C29-C36	100	nsl	-	LPQL	LPQL
Total Hydrocarbons C10-C36	-	600[b]	-	LPQL	LPQL
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)					
Benzene	1	950[a]	-	LPQL	LPQL
Toluene	1	180[a]	-	LPQL	LPQL
Ethylbenzene	1	80[a]	-	LPQL	LPQL
m+p-xylene	2	75[m]	-	LPQL	LPQL
o-xylene	1	350[a]	-	LPQL	LPQL
Total xylenes	3	nsl	-	LPQL	LPQL
Polycyclic Aromatic Hydrocarbons (PAHs)*					
Naphthalene	1	16[a]	nsl	LPQL	LPQL
Acenaphthylene	1	nsl	nsl	LPQL	LPQL
Acenaphthene	1	nsl	400	LPQL	LPQL
Fluorene	1	nsl	220	LPQL	LPQL
Phenanthrene	1	0.6[c]	nsl	LPQL	LPQL
Anthracene	1	0.01[c]	nsl	LPQL	LPQL
Fluoranthene	1	1[c]	nsl	LPQL	LPQL
Pyrene	1	nsl	87	LPQL	LPQL
Benzo(a)anthracene	1	nsl	0.029	LPQL	LPQL
Chrysene	1	nsl	2.9	LPQL	LPQL
Benzo(b,k)fluoranthene	2	nsl	0.029[r]	LPQL	LPQL
Benzo(a)pyrene	1	0.1[c]	nsl	LPQL	LPQL
Indeno(1,2,3-c,d)pyrene	1	nsl	0.029	LPQL	LPQL
Dibenzo(a,h)anthracene	1	nsl	0.0029	LPQL	LPQL
Benzo(g,h,i)perylene	1	nsl	nsl	LPQL	LPQL
Total PAHs	-	nsl	nsl	LPQL	LPQL
Organochlorine Pesticides (OCPs)**					
Aldrin	0.01	0.001[a]	-	**0.03**	LPQL
Chlordane	0.01	0.03[c]	-	LPQL	LPQL
DDE	0.01	0.03[a]	nsl	LPQL	LPQL
DDT	0.01	0.006[c]	-	LPQL	LPQL
Dieldrin	0.01	0.01[a]	-	**0.04**	LPQL
Endosulfan	0.01	0.03[c]	-	**0.58**	LPQL
Endrin	0.01	0.01[c]	11	LPQL	LPQL
Heptachlor	0.01	0.01[c]	-	LPQL	LPQL
Methoxychlor	0.01	0.005[c]	-	LPQL	LPQL
Organophosphate Pesticides (OPPs)					
Dimethoate	0.01	0.15[a]	-	LPQL	LPQL
Diazinon	0.01	0.01[a]	-	LPQL	LPQL
Ronnel (fenchlorphos)	0.01	nsl	1800	LPQL	LPQL
Fenitrothion	0.01	0.2[a]	-	LPQL	LPQL
Chlorpyriphos	0.01	0.01	-	LPQL	LPQL
Bromophos-ethyl	0.01	nsl	-	LPQL	LPQL
Ethion	0.01	nsl	-	LPQL	LPQL
Polychlorinated Biphenyls (PCBs)*					
Aroclor 1016	0.1	0.001[a]	0.96	LPQL	LPQL
Aroclor 1221	0.1	1[a]	0.0068	LPQL	LPQL
Aroclor 1232	0.1	0.3[a]	0.0068	LPQL	LPQL
Aroclor 1242	0.1	0.3[a]	0.034	LPQL	LPQL
Aroclor 1248	0.1	0.03[a]	0.034	LPQL	LPQL
Aroclor 1254	0.1	0.01[a]	0.034	LPQL	LPQL
Aroclor 1260	0.1	nsl	0.034	LPQL	LPQL
Total PCBs	0.1	nsl	nsl	LPQL	LPQL

EXPLANATION:

1 - ANZECC Australian Water Quality Guidelines for Fresh Waters, 2000 - Trigger Values for protection of 95% of species
2 - NHMRC Australian Drinking Water Guidelines (2011)
5 - In the absence of Australian guidelines, the USEPA (2012) Region 9 Screening Levels for tapwater have been adopted as a preliminary screening tool

a - In the absence of a high reliability guideline concentration, the moderate or low reliability guideline concentration has been quoted
b - In the absence of locally endorsed guidelines, the Dutch intervention levels *(Ministry of Housing and the Environment 2000)* have been quoted
c - 99% trigger values adopted due to the potential for bioaccumulation effects
i - ANZECC 2000 - Level for NSW Lowland Rivers.
m - Guideline value adopted for m-Xylene. We note that the m-Xylene guideline value is 75ug/L and the p-Xylene guideline value is 200ug/L. However these two isomers cannot be distinguished analytically. Therefore EIS have adopted the more conservative guideline value
r - The more conservative value for Benzo(b)fluoranthene has been adopted
* PQLs for some individual compounds were greater than the GILs
** We note that the The PQLs for some compounds are above the GILs

Concentration above the GIL **VALUE**

ABBREVIATIONS:
na: Not Analysed
nsl: No Set Limit
GIL - Groundwater Investigation Levels
PQL: Practical Quantitation Limit
LPQL: Less than Practical Quantitation Limit
(-) : Not Applicable

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 = BH108(0.2-0.4m)	Arsenic	4	80	50	65	46.2
Dup Ref = Dup1	Cadmium	0.5	LPQL	LPQL	nc	nc
	Chromium	1	19	13	16	37.5
Envirolab Report: 86615	Copper	1	11	5	8	75.0
	Lead	1	110	55	82.5	66.7
	Mercury	0.1	LPQL	LPQL	nc	nc
	Nickel	1	6	3	4.5	66.7
	Zinc	1	71	36	53.5	65.4
	Naphthalene	0.1	LPQL	LPQL	nc	nc
	Acenaphthylene	0.1	LPQL	LPQL	nc	nc
	Acenaphthene	0.1	LPQL	LPQL	nc	nc
	Fluorene	0.1	LPQL	LPQL	nc	nc
	Phenanthrene	0.1	LPQL	LPQL	nc	nc
	Anthracene	0.1	LPQL	LPQL	nc	nc
	Fluoranthene	0.1	LPQL	LPQL	nc	nc
	Pyrene	0.1	LPQL	LPQL	nc	nc
	Benzo(a)anthracene	0.1	LPQL	LPQL	nc	nc
	Chrysene	0.1	LPQL	LPQL	nc	nc
	Benzo(b)&(k)fluorant	0.2	LPQL	LPQL	nc	nc
	Benzo(a)pyrene	0.05	LPQL	LPQL	nc	nc
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	nc	nc
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	nc	nc
	Benzo(ghi)perylene	0.1	LPQL	LPQL	nc	nc
	C_6-C_9 TPH	25	LPQL	LPQL	nc	nc
	C_{10}-C_{14} TPH	50	LPQL	LPQL	nc	nc
	C_{15}-C_{28} TPH	100	LPQL	LPQL	nc	nc
	C_{29}-C_{36} TPH	100	LPQL	LPQL	nc	nc
	Benzene	0.5	LPQL	LPQL	nc	nc
	Toluene	0.5	LPQL	LPQL	nc	nc
	Ethylbenzene	1	LPQL	LPQL	nc	nc
	m + p-xylene	2	LPQL	LPQL	nc	nc
	o-xylene	1	LPQL	LPQL	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

RPD Results Above the Acceptance Criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
na: Not Analysed
nc: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TPH: Total Petroleum Hydrocarbons

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

SAMPLE	ANALYSIS	Envirolab PQL	NMI PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH110(0-0.1m)	Arsenic	4	0.5	700	660	680	5.9
Dup Ref = Dup3	Cadmium	0.5	0.5	LPQL	LPQL	nc	nc
	Chromium	1	0.5	20	21	20.5	4.9
Envirolab Report: 86615	Copper	1	0.5	230	190	210	19.0
NMI Report: N13/005751	Lead	1	0.5	100	260	180	88.9
	Mercury	0.1	0.2	0.2	LPQL	0.2	nc
	Nickel	1	0.5	5	11	8	75.0
	Zinc	1	0.5	250	230	240	8.3
	Naphthalene	0.1	0.5	LPQL	LPQL	nc	nc
	Acenaphthylene	0.1	0.5	LPQL	LPQL	nc	nc
	Acenaphthene	0.1	0.5	LPQL	LPQL	nc	nc
	Fluorene	0.1	0.5	LPQL	LPQL	nc	nc
	Phenanthrene	0.1	0.5	LPQL	LPQL	nc	nc
	Anthracene	0.1	0.5	LPQL	LPQL	nc	nc
	Fluoranthene	0.1	0.5	0.1	LPQL	0.1	nc
	Pyrene	0.1	0.5	0.1	LPQL	0.1	nc
	Benzo(a)anthracene	0.1	0.5	LPQL	LPQL	nc	nc
	Chrysene	0.1	0.5	LPQL	LPQL	nc	nc
	Benzo(b)&(k)fluorant	0.2	1	LPQL	LPQL	nc	nc
	Benzo(a)pyrene	0.05	0.5	0.07	LPQL	0.07	nc
	Indeno(123-cd)pyrene	0.1	0.5	LPQL	LPQL	nc	nc
	Dibenzo(ah)anthracene	0.1	0.5	LPQL	LPQL	nc	nc
	Benzo(ghi)perylene	0.1	0.5	LPQL	LPQL	nc	nc
	Total OCPs	0.1	0.1	LPQL	LPQL	nc	nc
	Total OPPs	0.1	0.1	LPQL	LPQL	nc	nc
	Total PCBs	0.1	0.1	LPQL	LPQL	nc	nc
	C_6-C_9 TPH	25	25	LPQL	LPQL	nc	nc
	C_{10}-C_{14} TPH	50	50	LPQL	LPQL	nc	nc
	C_{15}-C_{28} TPH	100	100	LPQL	LPQL	nc	nc
	C_{29}-C_{36} TPH	100	100	LPQL	LPQL	nc	nc
	Benzene	0.5	0.5	LPQL	LPQL	nc	nc
	Toluene	0.5	0.5	LPQL	LPQL	nc	nc
	Ethylbenzene	1	0.5	LPQL	LPQL	nc	nc
	m + p-xylene	2	1	LPQL	LPQL	nc	nc
	o-xylene	1	0.5	LPQL	LPQL	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

RPD Results Above the Acceptance Criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
na: Not Analysed
nc: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TPH: Total Petroleum Hydrocarbons

TABLE J
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 = MW101	Arsenic	1	3	3	3	0.0
Dup Ref = Dup1	Cadmium	0.1	0.2	0.2	0.2	0.0
	Chromium	1	3	2	2.5	40.0
Envirolab Report: 86620	Copper	1	2	2	2	0.0
	Lead	1	LPQL	LPQL	nc	nc
	Mercury	0.5	LPQL	LPQL	nc	nc
	Nickel	1	3	3	3	0.0
	Zinc	1	63	64	63.5	1.6
	C_6-C_9 TPH	10	LPQL	LPQL	nc	nc
	C_{10}-C_{14} TPH	50	LPQL	LPQL	nc	nc
	C_{15}-C_{28} TPH	100	LPQL	LPQL	nc	nc
	C_{29}-C_{36} TPH	100	LPQL	LPQL	nc	nc
	Benzene	1	LPQL	LPQL	nc	nc
	Toluene	1	LPQL	LPQL	nc	nc
	Ethylbenzene	1	LPQL	LPQL	nc	nc
	m + p-xylene	2	LPQL	LPQL	nc	nc
	o-xylene	1	LPQL	LPQL	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

RPD Results Above the Acceptance Criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
na: Not Analysed
nc: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TPH: Total Petroleum Hydrocarbons

TABLE K
SUMMARY OF QA/QC - TRIP SPIKE, FIELD BLANK AND RINSATE RESULTS

ANALYSIS	Envirolab PQL		FB1[S] 28.2.13 Report No. 86615	RS1[W] 28.2.13 Report No. 86615	TS1[W] 28.2.13 Report No. 86620
	mg/kg	µg/L	mg/kg	µg/kg	% Recovery
Benzene	1	1	LPQL	LPQL	88
Toluene	1	1	LPQL	LPQL	91
Ethylbenzene	1	1	LPQL	LPQL	94
m + p-xylene	2	2	LPQL	LPQL	95
o-xylene	1	1	LPQL	LPQL	96

EXPLANATION:

[W] Sample type (water)

[S] Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria VALUE

ABBREVIATIONS:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
(-) : Not Applicable / Not Analysed
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
TB: Trip Blank
TS: Trip Spike
RS: Rinsate Sample
na: Not Analysed
nc: Not Calculated
TPH: Total Petroleum Hydrocarbons

TABLE L
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 = BH205 (0-0.2m)	Arsenic	4	10	5	7.5	67
Dup Ref = DupA	Lead	1	280	240	260.0	15
	HCB	0.1	LPQL	LPQL	NC	NC
Envirolab Report: 114380	Endosulfan	0.1	LPQL	LPQL	NC	NC
	Methoxychlor	0.1	LPQL	LPQL	NC	NC
	Aldrin & Dieldrin	0.1	LPQL	LPQL	NC	NC
	Chlordane	0.1	LPQL	LPQL	NC	NC
	DDT, DDD & DDE	0.1	LPQL	LPQL	NC	NC
	Heptachlor	0.1	LPQL	LPQL	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

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls

TABLE M
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 = BH210 (0-0.1m)	Arsenic	4	220	180	200.0	20
Dup Ref = DupB	Lead	1	340	230	285.0	39
	HCB	0.1	LPQL	LPQL	NC	NC
Envirolab Report: 114380	Endosulfan	0.1	LPQL	LPQL	NC	NC
	Methoxychlor	0.1	LPQL	LPQL	NC	NC
	Aldrin & Dieldrin	0.1	0.1	0.1	0.1	0
	Chlordane	0.1	LPQL	LPQL	NC	NC
	DDT, DDD & DDE	0.1	1	1	1.0	0
	Heptachlor	0.1	LPQL	LPQL	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

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls

APPENDIX A

Borehole Logs and Explanatory Notes

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **101** 1/2

Client: BUPA
Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)
Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z
Date: 28-2-13
Method: SPIRAL AUGER JK305
Logged/Checked by: D.S./
R.L. Surface: ≈ 150.3m
Datum: AHD

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 sandy gravel, fine to medium grained igneous and alluvial river gravel, light grey brown and dark brown, trace of ash.				
					N = 11 4,5,6			CH	SILTY CLAY: high plasticity, orange brown, trace of fine to medium grained ironstone gravel and ash.	MC>PL	VSt	270 270 320	
						1							
					N = 22 8,8,14				SILTY CLAY: high plasticity, light grey mottled red brown, with fine to medium grained ironstone gravel.		H	450 500 500	
						2							
					N = 22 10,10,12	3						550 560 550	
						4							
▼ AFTER 5 HRS					N = 20 7,10,10							470 470 480	
						5							
					N > 12 10,12/ 30mm REFUSAL	6						500 300 310	
						7			END OF BOREHOLE AT 6.45m				HAND SLOTTED TEMPORARY PVC STANDPIPE INSTALLED TO 6.45m

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **101** 2/2

Client: BUPA

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z
Date: 28-2-13
Method: SPIRAL AUGER JK305
Logged/Checked by: D.S./
R.L. Surface: ≈ 150.3m
Datum: AHD

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
						8							DEPTH
						9							
						10							
						11							
						12							
						13							
						14							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **102** 1/1

Client: BUPA
Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)
Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z **Method:** SPIRAL AUGER JK305 **R.L. Surface:** ≈ 151.3m
Date: 28-2-13 **Datum:** AHD
Logged/Checked by: D.S./

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 sandy clay, medium plasticity, dark brown, with fine to medium grained river stone gravel.	MC>PL			
					N = 9 3,4,5	1		CL	SILTY CLAY: medium plasticity, orange brown and light brown, trace of fine grained ironstone gravel.	MC>PL	St	150 180 150	
					N = 10 3,4,6	2		CH	SILTY CLAY: high plasticity, light grey mottled orange brown, trace of fine to medium grained ironstone gravel.			180 190 200	
▼ AFTER 4 HRS					N = 19 7,8,11	3			SILTY CLAY: high plasticity, light grey, with fine to medium grained ironstone gravel.		H	450 450 500	
					N = 17 5,7,10	4					VSt	250 250 300	
						5							
						6			END OF BOREHOLE AT 6.0m				HAND SLOTTED TEMPORARY PVC STANDPIPE INSTALLED TO 6m DEPTH
						7							

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **103** 1/1

Client: BUPA

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z **Method:** SPIRAL AUGER JK305 **R.L. Surface:** ≈ 151.2m

Date: 28-2-13 **Datum:** AHD

Logged/Checked by: D.S./

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
						0			FILL: Gravel, fine to medium grained crushed concrete, light grey.	M			
									FILL: Silty sand, fine to medium grained, dark grey.				
								CH	SILTY CLAY: high plasticity, orange brown.	MC>PL	VSt	350 350 350	
					N = 10 3,4,6	1							
					N = 14 7,6,8							330 350 350	
						2							
ON COMPLET-ION & AFTER 3.25 HRS ▼									SILTY CLAY: high plasticity, orange brown mottled red brown and light grey, with fine to medium grained ironstone gravel.		St-VSt	250 210 300	
					N = 11 4,5,6	3							
▶						4							
					N = 10 4,5,5	5					St	180 180 200	
						6			END OF BOREHOLE AT 6.0m				
						7							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 104 1/2

Client: BUPA

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z **Method:** SPIRAL AUGER JK305 **R.L. Surface:** ≈ 150.8m

Date: 28-2-13 **Datum:** AHD

Logged/Checked by: D.S./

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 grey, with fine to medium grained river stone gravel, ash and slag.				
								CH		MC<PL	St-VSt		TOO FRIABLE FOR HP TESTING
					N = 11 4,5,6	1			SILTY CLAY: high plasticity, orange brown, with fine to medium grained ironstone gravel.				
										MC≈PL			
					N = 12 3,5,7	2						170 200 220	
▼ AFTER 2 HRS					N = 24 8,11,13	3			SILTY CLAY: high plasticity, orange brown mottled red brown and light grey, with fine to medium grained ironstone gravel.	MC>PL	H	450 450 450	
						4							
▶					N = 17 7,8,9						VSt	380 380 380	
						5							
											St	150 150 150	
						6		-	SANDSTONE: fine to medium grained, light grey.	XW	EL		VERY LOW 'TC' BIT RESISTANCE
						7							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **104** 2/2

Client: BUPA

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z
Date: 28-2-13
Method: SPIRAL AUGER JK305
Logged/Checked by: D.S./
R.L. Surface: ≈ 150.8m
Datum: AHD

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
						8			SANDSTONE: fine to medium grained, light grey.	XW	EL		
						9				DW-SW	L-M		LOW TO MODERATE RESISTANCE
						10							
						11			SANDSTONE: fine to medium grained, light grey, with iron indurated seams.				MODERATE RESISTANCE WITH BANDED HIGH RESISTANCE
						12			END OF BOREHOLE AT 12.0m				
						13							
						14							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. **105** 1/1

Client: BUPA

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z **Method:** SPIRAL AUGER JK305 **R.L. Surface:** ≈ 151.2m

Date: 28-2-13 **Datum:** AHD

Logged/Checked by: D.S./

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 clay, low plasticity, red brown, with fine to medium grained river stone gravel, trace of ash.	MC<PL			
								CH	SILTY CLAY: high plasticity, orange brown, with fine to medium grained ironstone gravel.	MC<PL	H	450 500 500	
					N = 12 5,6,6	1							
									SILTY CLAY: high plasticity, light grey, with fine to medium grained ironstone gravel.			550 500 550	
					N = 20 7,8,12	2							
						3						>600 >600 >600	
					N = 26 9,12,14								
						4							
												450 480 500	
					N = 20 8,10,10	5							
▼ AFTER 1 HR						6			END OF BOREHOLE AT 6.0m				
						7							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

BOREHOLE LOG

Borehole No. 106
1/1

Client: BUPA
Project: PROPOSED RESIDENTIAL AGED CARE FACILITY (RACF)
Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. 26305Z
Date: 28-2-13
Method: SPIRAL AUGER JK305
Logged/Checked by: D.S./
R.L. Surface: ≈ 151.4m
Datum: AHD

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, with fine to medium grained river stone gravel, ash and slag.	D			
					N = 14 4,6,8	1		CH	SILTY CLAY: high plasticity, orange brown.	MC>PL	VSt	260 300 220	
					N = 18 7,9,9	2			SILTY CLAY: high plasticity, light grey, with fine to medium grained ironstone gravel.	MC<PL	H	550 >600 >600	
								-	SANDSTONE: fine to medium grained, light grey, with clay seams.	XW	EL		BANDED VERY LOW 'TC' BIT RESISTANCE
						3			SANDSTONE: fine to medium grained, light grey, with L-M strength iron indurated seams.				BANDED LOW TO MODERATE RESISTANCE
						5			SANDSTONE: fine to medium grained, light grey, with M strength iron indurated bands.	DW	L		MODERATE RESISTANCE
									as above, but with M-H strength iron indurated bands.				MODERATE TO HIGH RESISTANCE
						6			END OF BOREHOLE AT 6.0m				
						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: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 25-2-13 **Datum:**

Logged/Checked by: C.H./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0		-	ASHPHALTIC CONCRETE: 30mm.t.	M			
									FILL: Silty sand, fine to coarse grained, yellow brown with igneous gravel.	MC>PL			
								CH	FILL: Silty clay, medium plasticity, grey orange brown, with ash and igneous gravel.	MC>PL			
						0.5			SILTY CLAY: high plasticity, yellow brown mottled orange brown.				
									END OF BOREHOLE AT 0.7m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. 108

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 25-2-13 **Datum:**

Logged/Checked by: C.H./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0		CL	FILL: Silty sand, fine to coarse grained, brown, with medium grained/ quartz and igneous gravels.	M			MIXED COARSE GRAINED SAND AND MEDIUM GRAINED GRAVEL ON SURFACE
									SILTY CLAY: medium plasticity, grey orange brown, with ash, igneous gravel and terracotta fragments.	MC>PL			
						0.5			SILTY CLAY: high plasticity, yellow brown mottled orange brown.	MC>PL			
									END OF BOREHOLE AT 0.75m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. **109** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 25-2-13 **Datum:**

Logged/Checked by: C.H./

Groundwater Record	SAMPLES ES	SAMPLES ASB	SAMPLES AIB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0			FILL: Silty sand: fine to coarse grained, brown with medium sized quartz gravel, ash, slag and clay nodules.	M			MIXED COARSE GRAINED SAND AND MEDIUM GRAINED GRAVEL ON SURFACE
						0.5		CH	SILTY CLAY: high plasticity, yellow brown mottled orange brown.	MC>PL			
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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ENVIRONMENTAL LOG

Borehole No. **110** 1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 25-2-13 **Datum:**

Logged/Checked by: C.H./[illegible]

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■			0		CH	FILL: Silty clay, medium plasticity, dark brown grey, with ash.	MC>PL			MIXED COARSE GRAINED SAND AND MEDIUM GRAINED GRAVEL ON SURFACE
									SILTY CLAY: high plasticity, yellow brown mottled orange brown.	MC>PL			
	■					0.5			END OF BOREHOLE AT 0.5m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. 111

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 26-2-13 **Datum:**

Logged/Checked by: C.H./RY

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION	■		■			0			FILL: Silty sand, fine to coarse grained, brown mottled light grey, with quartz gravel and ash. / FILL: Silty clay, low plasticity, brown mottled orange brown, with ash.	M MC≈PL			MIXED COARSE GRAINED SAND AND MEDIUM GRAINED GRAVEL ON SURFACE
	■					0.5		CH	SILTY CLAY: high plasticity, orange brown mottled red brown.	MC>PL			
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. 112

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 26-2-13 **Datum:**

Logged/Checked by: C.H./[illegible]

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION	■		■			0			FILL: Silty sandy gravel, fine to medium grained, dark brown, with ash and slag.	D			BARE SURFACE
									FILL: Silty clay, low plasticity, brown mottled orange brown, with ash.	MC≈PL			
	■							CH	SILTY CLAY: high plasticity, orange brown mottled red brown.	MC>PL			
						0.5			END OF BOREHOLE AT 0.5m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. 113

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 26-2-13 **Datum:**

Logged/Checked by: C.H./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION						0		CH	FILL: Silty sandy gravel, fine to coarse grained, with igneous gravel, ash and slag.	D			IGNEOUS GRAVEL FINE TO MEDIUM ON SURFACE
						0.5			SILTY CLAY: high plasticity, orange brown mottled red brown.	MC>PL			
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. 114

1/1

Environmental logs are not to be used for geotechnical purposes

Client: MIDSON GROUP PTY LTD

Project: PROPOSED RESIDENTIAL AGED CARE FACILITY DEVELOPMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW, 2075

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:**

Date: 26-2-13 **Datum:**

Logged/Checked by: C.H./[illegible]

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLE -TION	■		■			0			FILL: Silty sandy gravel, fine to coarse grained, with igneous gravel, ash and slag.	D			MIXED COARSE GRAINED SAND AND MEDIUM GRAINED GRAVEL ON SURFACE
	■					0.5		CH	SILTY CLAY: high plasticity, orange brown mottled red brown, trace of ironstone gravel.	MC>PL			
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. 201

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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 sandy gravel, fine to medium grained quartz and igneous, brown.	D			
									FILL: Silty clay, medium to high plasticity, brown and light brown, trace of ash, root fibres, fine to medium grained ironstone gravel and sand.	MC>PL			
						0.5		CL-CH	SILTY CLAY: medium to high plasticity, light brown, trace of root fibres and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
									END OF BOREHOLE AT 0.8m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. 202

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Gravelly silty sand, fine to medium grained, brown and grey, fine to medium grained quartz, igneous and ironstone gravel, trace of ash and slag.	D			
						0.5		CL-CH	SILTY CLAY: medium to high plasticity, light brown and orange brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
									END OF BOREHOLE AT 0.8m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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EIS

ENVIRONMENTAL LOG

Borehole No. 203

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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, brown, trace of root fibres and glass fragments.	D			
								CL-CH	SILTY CLAY: medium to high plasticity, light brown.	MC>PL			RESIDUAL
						0.5							
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. 204

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Sandy silty gravel, fine to medium grained quartz and igneous, brown.	D			
									FILL: Silty clay, medium plasticity, light brown and brown, trace of fine to medium grained ironstone gravel, ash and concrete fragments.	MC>PL			
						0.5			END OF BOREHOLE AT 0.3m				HAND AUEGR REFUSAL ON OBSTRUCTION IN FILL
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

ENVIRONMENTAL LOG

Borehole No. 205

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Gravelly silty sand, fine to medium grained, brown, fine to medium grained quartz and igneous grey, trace of ash and slag.	D			
									FILL: Silty clay, medium to high plasticity, brown, trace of ash, slag, fine to medium grained ironstone and igneous gravel.	MC>PL			
						0.5			END OF BOREHOLE AT 0.5m				HAND AUGER REFUSAL ON OBSTRUCTION IN FILL
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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EIS

ENVIRONMENTAL LOG

Borehole No. 206

Environmental logs are not to be used for geotechnical purposes

Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

Logged/Checked by: G.F./

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Gravelly clayey sand, fine to medium grained, red brown, light grey and yellow brown, fine to medium grained sandstone and ironstone gravel.	M MC>PL			GRAVEL COVER
						0.5		CL-CH	FILL: Silty clay, medium plasticity, brown, trace of slag, fine to medium grained sand and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
						1			SILTY CLAY: medium to high plasticity, light brown.				
									END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

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DRY ON COMPLETION	■					0			FILL: Silty gravelly sand, fine to medium grained quartz and igneous gravel, brown.	D			
						0.5			FILL: Silty clay, medium plasticity, brown, trace of ash, slag and fine to medium grained igneous and ironstone gravel.	MC>PL			
	■					1		CL	SILTY CLAY: medium plasticity, light brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
						1.5			END OF BOREHOLE AT 1.2m				
						2							
						2.5							
						3							
						3.5							

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Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Gravelly clayey sand, fine to medium grained, light grey, red brown and brown, fine to medium grained sandstone gravel.	M			GRAVEL COVER
									FILL: Silty clay, medium plasticity, brown and light brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			
						0.5		CH	SILTY CLAY: high plasticity, light brown and orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
						1			END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

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DRY ON COMPLETION	■					0			FILL: Gravelly silty sand, fine to medium grained, grey and brown, fine to medium grained quartz and igneous gravel.	D			GRAVEL COVER
	■							CH	SILTY CLAY: high plasticity, light brown and orange brown, trace of fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
						0.5			END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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Client: BUPA

Project: FEASIBILITY ASSESSMENT

Location: 238 MONA VALE ROAD, ST IVES, NSW

Job No. E26305K **Method:** HAND AUGER **R.L. Surface:** N/A

Date: 7-8-14 **Datum:**

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Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Sandy gravel, fine to medium grained quartz, brown.	D			
									FILL: Silty clay, medium plasticity, brown, trace of fine to medium grained sand, ash, slag and fine to medium grained ironstone gravel.	MC>PL			
						0.5		CH	SILTY CLAY: high plasticity, light brown and orange brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
						1			END OF BOREHOLE AT 0.9m				
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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ENVIRONMENTAL LOG

Borehole No. 211

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Client: BUPA

Project: FEASIBILITY ASSESSMENT

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DRY ON COMPLETION	■					0			FILL: Gravelly silty sand, fine to medium grained, brown, fine to medium grained quartz and igneous gravel, trace of ash and slag.	D			
								CL-CH	SILTY CLAY: medium to high plasticity, light brown and orange brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
	■					0.5							
									END OF BOREHOLE AT 0.6m				
						1							
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

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Borehole No. 212

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Project: FEASIBILITY ASSESSMENT

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Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	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: Gravelly silty sand, fine to medium grained, grey and brown, fine to medium grained igneous gravel.	M			
	■								FILL: Silty sand, fine to medium grained, brown, trace of ash.				
						0.5		CH	SILTY CLAY: high plasticity, light brown and orange brown, trace of ash and fine to medium grained ironstone gravel.	MC>PL			RESIDUAL
	■					1			END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

EXPLANATORY NOTES – ENVIRONMENTAL LOGS

INTRODUCTION

These notes have been provided to supplement the environmental report with regards to drilling and field logging. 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 manmade processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies involve gathering and assimilating limited facts about these characteristics and properties in order to understand the ground on a particular site under certain conditions. These conditions 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, the SAA Site Investigation Code. 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 geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below (note that unless stated in the report, the soil classification is based on a qualitative field assessment, not laboratory testing):

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2mm
Gravel	2 to 60mm

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	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as shown in the following table:

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	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 thinly bedded to laminated siltstone.

DRILLING OR EXCAVATION METHODS

The following is a brief summary of drilling and excavation methods currently adopted by the Company, and some comments on their use and application. All except test pits and hand auger drilling require the use of a mechanical drilling rig.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descend into the pit. The depth of penetration is limited to approximately 3m for a backhoe and up to 6m for an excavator. Limitations of test pits include problems associated with disturbance and difficulty of reinstatement; and the consequent effects on nearby structures. Care must be taken if construction is to be carried out near test pit locations to either properly re-compact 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. Premature refusal of the hand augers can occur on a variety of materials such as fill, hard clay, gravel or ironstone, 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 in-situ 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 relatively lower 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 fragments. 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 determined 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 such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (e.g. 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, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, 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 CORE LOSS. The locations of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end 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, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

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 63kg 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. Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test 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 "Nc" 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 attached explanatory notes define the terms and symbols used in preparation of the logs.

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; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising 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 (e.g. bricks, concrete, plastic, slag/ash, 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 determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. If the volume and quality 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 classifications and rocks strengths indicated on the environmental logs unless noted in the report.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, EIS should be notified immediately.

GRAPHIC LOG SYMBOLS FOR SOIL AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

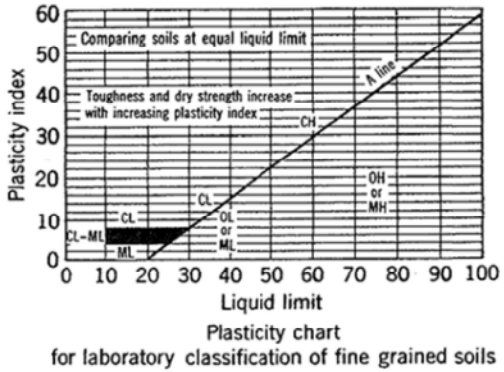
OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

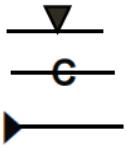
Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)						Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above "A" line, with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below "A" line with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size	Identification Procedures on Fraction Smaller than 380 μm Sieve Size		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
	Silts and clays liquid limit less than 50		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown. Extent of borehole collapse shortly after drilling. Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES U50 DB DS ASB ASS SAL	Soil sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos screening. Soil sample taken over depth indicated, for acid sulfate soil analysis. 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 show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3 R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of Undrained Shear Strength. Photoionisation detector reading in ppm (Soil sample heads pace test).
Moisture (Cohesive Soils) (Cohesionless)	MC > PL MC ≈ PL MC < PL D M W	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. DRY – Runs freely through fingers. MOIST – Does not run freely but no free water visible on soil surface. WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt H ( )	VERY SOFT – Unconfined compressive strength less than 25kPa SOFT – Unconfined compressive strength 25-5 0kPa FIRM – Unconfined compressive strength 50-1 00kPa STIFF – Unconfined compressive strength 100- 200kPa VERY STIFF – Unconfined compressive strength 200- 400kPa HARD – Unconfined compressive strength greater than 400kPa Bracketed symbol indicates estimated consistency based o n tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (ID) Range (%)** / **SPT ' N' Value Range (Blows/300mm)** Very Loose <15 / 0-4 Loose 15-35 / 4-10 Medium Dense 35-65 / 10-30 Dense 65-85 / 30-50 Very Dense >85 / >50 Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise
Remarks	'V' bit 'TC' bit T_{60}	Hardened steel 'V' shaped bit. Tungsten carbide wing bit. Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

LOG SYMBOLS CONTINUED

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining and Geomechanics Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL	0.03	Easily remoulded by hand to a material with soil properties.
Very Low:	VL	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low:	L	0.3	A piece of core 150 mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength:	M	1	A piece of core 150 mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High:	H	3	A piece of core 150 mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High:	VH	10	A piece of core 150 mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150 mm long x 50mm dia. is very difficult to break with h and-held hammer . Rings when struck with a hammer.

ROCK STRENGTH

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to (i.e. relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Iron stained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

APPENDIX B

Laboratory Reports and Chain of Custody Documents

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

CERTIFICATE OF ANALYSIS 86615

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E26305K, St Ives**
No. of samples:	32 Soils, 1 Water
Date samples received / completed instructions received	01/03/13 / 01/03/13

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	8/03/13 / 8/03/13
Date of Preliminary Report:	Not issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Nancy Zhang
Chemist

Lulu Guo
Approved Signatory

Alex MacLean
Chemist

ACCREDITED FOR TECHNICAL COMPETENCE

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-8
Your Reference	----------	BH101	BH102	BH103	BH104	BH104
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.5-0.95
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - 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
Surrogate aaa-Trifluorotoluene	%	103	104	102	107	100

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	86615-9	86615-10	86615-11	86615-13	86615-17
Your Reference	----------	BH105	BH105	BH106	BH107	BH109
Depth	----------	0.0-0.2	0.5-0.95	0.0-0.2	0.1-0.3	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - 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
Surrogate aaa-Trifluorotoluene	%	106	106	104	108	104

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	86615-19	86615-21	86615-22	86615-23	86615-24
Your Reference	----------	BH110	BH111	BH111	BH111	BH112
Depth	----------	0.0-0.1	0.0-0.5	0.05-0.1	0.4-0.6	0.0-0.05
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - 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
Surrogate aaa-Trifluorotoluene	%	103	103	107	100	101

vTRH(C6-C10)/BTEXN in Soil					
Our Reference:	UNITS	86615-28	86615-29	86615-30	86615-32
Your Reference	----------	BH114	BH114	DUP1	FB1
Depth	----------	0.0-0.1	0.2-0.4	-	-
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	[NA]
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	[NA]
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	104	103	106	115

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-8
Your Reference	----------	BH101	BH102	BH103	BH104	BH104
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.5-0.95
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	150	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	160	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	119	94	88	95	65

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	86615-9	86615-10	86615-11	86615-13	86615-17
Your Reference	----------	BH105	BH105	BH106	BH107	BH109
Depth	----------	0.0-0.2	0.5-0.95	0.0-0.2	0.1-0.3	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - 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
Surrogate o-Terphenyl	%	125	91	92	93	94

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	86615-19	86615-21	86615-22	86615-23	86615-24
Your Reference	----------	BH110	BH111	BH111	BH111	BH112
Depth	----------	0.0-0.1	0.0-0.5	0.05-0.1	0.4-0.6	0.0-0.05
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	310
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	490
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	660
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	230
Surrogate o-Terphenyl	%	93	115	106	88	114

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	86615-28	86615-29	86615-30
Your Reference	----------	BH114	BH114	DUP1
Depth	----------	0.0-0.1	0.2-0.4	-
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100
TRHC$_{29}$ - 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
Surrogate o-Terphenyl	%	91	99	87

PAHs in Soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-8
Your Reference	----------	BH101	BH102	BH103	BH104	BH104
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.5-0.95
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
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+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	<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
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	127	111	105	111	72

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	86615-9 BH105 0.0-0.2 28/02/2013 Soil	86615-10 BH105 0.5-0.95 28/02/2013 Soil	86615-11 BH106 0.0-0.2 28/02/2013 Soil	86615-13 BH107 0.1-0.3 28/02/2013 Soil	86615-17 BH109 0.0-0.2 28/02/2013 Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
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+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.06	<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
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	76	106	109	108	114

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	86615-19 BH110 0.0-0.1 28/02/2013 Soil	86615-21 BH111 0.0-0.5 28/02/2013 Soil	86615-22 BH111 0.05-0.1 28/02/2013 Soil	86615-23 BH111 0.4-0.6 28/02/2013 Soil	86615-24 BH112 0.0-0.05 28/02/2013 Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013	05/03/2013	05/03/2013
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	0.4
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	0.6
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.4
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+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	0.2
Benzo(a)pyrene	mg/kg	0.07	<0.05	<0.05	<0.05	0.07
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
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	109	109	115	99	109

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	86615-28 BH114 0.0-0.1 28/02/2013 Soil	86615-29 BH114 0.2-0.4 28/02/2013 Soil	86615-30 DUP1 - 28/02/2013 Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013
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+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
Benzo(a)pyrene TEQ	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d_{14}	%	112	116	110

Organochlorine Pesticides in soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-9
Your Reference	----------	BH101	BH102	BH103	BH104	BH105
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
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	0.4	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
pp-DDD	mg/kg	0.8	<0.1	<0.1	<0.1	0.1
Endosulfan II	mg/kg	0.5	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	0.2	<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	0.3	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	102	98	101	83

Organochlorine Pesticides in soil						
Our Reference:	UNITS	86615-11	86615-13	86615-17	86615-19	86615-21
Your Reference	----------	BH106	BH107	BH109	BH110	BH111
Depth	----------	0.0-0.2	0.1-0.3	0.0-0.2	0.0-0.1	0.0-0.5
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
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	0.2
Dieldrin	mg/kg	2.8	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	0.2	<0.1	<0.1	<0.1	0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	0.6
pp-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
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	0.9
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	100	103	102	108

Organochlorine Pesticides in soil				
Our Reference:	UNITS	86615-22	86615-24	86615-28
Your Reference	----------	BH111	BH112	BH114
Depth	----------	0.05-0.1	0.0-0.05	0.0-0.1
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013
HCB	mg/kg	<0.1	<0.1	0.6
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	0.2
Dieldrin	mg/kg	<0.1	<0.1	0.2
Endrin	mg/kg	<0.1	0.6	<0.1
pp-DDD	mg/kg	<0.1	0.6	0.4
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	0.6	0.4
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
Surrogate TCMX	%	104	100	103

Organophosphorus Pesticides						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-9
Your Reference	----------	BH101	BH102	BH103	BH104	BH105
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
Diazinon	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
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	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
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	119	102	98	101	83

Organophosphorus Pesticides						
Our Reference:	UNITS	86615-11	86615-13	86615-17	86615-19	86615-21
Your Reference	----------	BH106	BH107	BH109	BH110	BH111
Depth	----------	0.0-0.2	0.1-0.3	0.0-0.2	0.0-0.1	0.0-0.5
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
Diazinon	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
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	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
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	102	100	103	102	108

Organophosphorus Pesticides				
Our Reference:	UNITS	86615-22	86615-24	86615-28
Your Reference	----------	BH111	BH112	BH114
Depth	----------	0.05-0.1	0.0-0.05	0.0-0.1
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	104	100	103

PCBs in Soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-9
Your Reference	----------	BH101	BH102	BH103	BH104	BH105
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	119	102	98	101	83

PCBs in Soil						
Our Reference:	UNITS	86615-11	86615-13	86615-17	86615-19	86615-21
Your Reference	----------	BH106	BH107	BH109	BH110	BH111
Depth	----------	0.0-0.2	0.1-0.3	0.0-0.2	0.0-0.1	0.0-0.5
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013	06/03/2013	06/03/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	102	100	103	102	108

PCBs in Soil				
Our Reference:	UNITS	86615-22	86615-24	86615-28
Your Reference	----------	BH111	BH112	BH114
Depth	----------	0.05-0.1	0.0-0.05	0.0-0.1
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date extracted	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	06/03/2013	06/03/2013	06/03/2013
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1
Arochlor 1221	mg/kg	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	104	100	103

Acid Extractable metals in soil						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-8
Your Reference	----------	BH101	BH102	BH103	BH104	BH104
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.5-0.95
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Arsenic	mg/kg	240	38	360	590	20
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	17	33	6	10	32
Copper	mg/kg	84	2	7	24	2
Lead	mg/kg	140	38	16	2,300	68
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	9	5	4	4	2
Zinc	mg/kg	190	7	90	72	4

Acid Extractable metals in soil						
Our Reference:	UNITS	86615-9	86615-10	86615-11	86615-13	86615-17
Your Reference	----------	BH105	BH105	BH106	BH107	BH109
Depth	----------	0.0-0.2	0.5-0.95	0.0-0.2	0.1-0.3	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Arsenic	mg/kg	18	14	47	58	260
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	16	35	14	24	20
Copper	mg/kg	19	3	15	14	22
Lead	mg/kg	180	28	930	510	110
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	3	2	6	22	7
Zinc	mg/kg	27	5	71	660	53

Acid Extractable metals in soil						
Our Reference:	UNITS	86615-19	86615-21	86615-22	86615-23	86615-24
Your Reference	----------	BH110	BH111	BH111	BH111	BH112
Depth	----------	0.0-0.1	0.0-0.5	0.05-0.1	0.4-0.6	0.0-0.05
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Arsenic	mg/kg	700	570	400	4	71
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	0.5
Chromium	mg/kg	20	21	18	39	12
Copper	mg/kg	130	280	170	<1	110
Lead	mg/kg	100	450	45	13	140
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5	8	3	3	12
Zinc	mg/kg	250	190	57	3	300

Acid Extractable metals in soil						
Our Reference:	UNITS	86615-28	86615-29	86615-30	86615-34	86615-35
Your Reference	----------	BH114	BH114	DUP1	BH101 - Triplicate	BH110 - Triplicate
Depth	----------	0.0-0.1	0.2-0.4	-	0.0-0.1	0.0-0.1
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	04/03/2013	04/03/2013	04/03/2013	04/03/2013	04/03/2013
Arsenic	mg/kg	570	1,600	50	180	500
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	20	33	13	16	21
Copper	mg/kg	160	1	5	64	140
Lead	mg/kg	1,100	18	55	100	380
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	6	3	3	4	5
Zinc	mg/kg	110	58	36	120	150

Moisture						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-8
Your Reference	----------	BH101	BH102	BH103	BH104	BH104
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.5-0.95
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/03/13	04/03/13	04/03/13	04/03/13	04/03/13
Date analysed	-	05/03/13	05/03/13	05/03/13	05/03/13	05/03/13
Moisture	%	9.4	22	18	21	21

Moisture						
Our Reference:	UNITS	86615-9	86615-10	86615-11	86615-13	86615-17
Your Reference	----------	BH105	BH105	BH106	BH107	BH109
Depth	----------	0.0-0.2	0.5-0.95	0.0-0.2	0.1-0.3	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/03/13	04/03/13	04/03/13	04/03/13	04/03/13
Date analysed	-	05/03/13	05/03/13	05/03/13	05/03/13	05/03/13
Moisture	%	13	20	11	17	17

Moisture						
Our Reference:	UNITS	86615-19	86615-21	86615-22	86615-23	86615-24
Your Reference	----------	BH110	BH111	BH111	BH111	BH112
Depth	----------	0.0-0.1	0.0-0.5	0.05-0.1	0.4-0.6	0.0-0.05
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	04/03/13	04/03/13	04/03/13	04/03/13	04/03/13
Date analysed	-	05/03/13	05/03/13	05/03/13	05/03/13	05/03/13
Moisture	%	18	17	15	23	4.7

Moisture				
Our Reference:	UNITS	86615-28	86615-29	86615-30
Your Reference	----------	BH114	BH114	DUP1
Depth	----------	0.0-0.1	0.2-0.4	-
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date prepared	-	04/03/13	04/03/13	04/03/13
Date analysed	-	05/03/13	05/03/13	05/03/13
Moisture	%	17	23	18

Asbestos ID - soils						
Our Reference:	UNITS	86615-1	86615-3	86615-5	86615-7	86615-9
Your Reference	----------	BH101	BH102	BH103	BH104	BH105
Depth	----------	0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	7/03/2013	7/03/2013	7/03/2013	7/03/2013	7/03/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Dark brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils						
Our Reference:	UNITS	86615-11	86615-13	86615-17	86615-19	86615-21
Your Reference	----------	BH106	BH107	BH109	BH110	BH111
Depth	----------	0.0-0.2	0.1-0.3	0.0-0.2	0.0-0.1	0.0-0.5
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	7/03/2013	7/03/2013	7/03/2013	7/03/2013	7/03/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Dark brown fine-grained soil & rocks	Brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

Asbestos ID - soils				
Our Reference:	UNITS	86615-22	86615-24	86615-28
Your Reference	----------	BH111	BH112	BH114
Depth	----------	0.05-0.1	0.0-0.05	0.0-0.1
Date Sampled		28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil
Date analysed	-	7/03/2013	7/03/2013	7/03/2013
Sample mass tested	g	Approx 45g	Approx 45g	Approx 45g
Sample Description	-	Brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks	Dark brown fine-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected	No respirable fibres detected	No respirable fibres detected

BTEX in Water		
Our Reference:	UNITS	86615-33
Your Reference	----------	RS1
Depth	----------	-
Date Sampled		28/02/2013
Type of sample		Water
Date extracted	-	01/03/2013
Date analysed	-	03/03/2013
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	102
Surrogate toluene-d8	%	101
Surrogate 4-BFB	%	98

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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
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.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			05/03/2013	86615-1	05/03/2013 || 05/03/2013	LCS-5	05/03/2013
TRH C_6 - C_9	mg/kg	25	Org-016	<25	86615-1	<25 || <25	LCS-5	103%
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	86615-1	<25 || <25	LCS-5	103%
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	25	Org-016	[NT]	86615-1	<25 || <25	[NR]	[NR]
Benzene	mg/kg	0.2	Org-016	<0.2	86615-1	<0.2 || <0.2	LCS-5	108%
Toluene	mg/kg	0.5	Org-016	<0.5	86615-1	<0.5 || <0.5	LCS-5	102%
Ethylbenzene	mg/kg	1	Org-016	<1	86615-1	<1 || <1	LCS-5	95%
m+p-xylene	mg/kg	2	Org-016	<2	86615-1	<2 || <2	LCS-5	106%
o-Xylene	mg/kg	1	Org-016	<1	86615-1	<1 || <1	LCS-5	109%
naphthalene	mg/kg	1	Org-014	<1	86615-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	112	86615-1	103 || 104 || RPD: 1	LCS-5	105%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			06/03/2013	86615-1	06/03/2013 || 06/03/2013	LCS-5	06/03/2013
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	86615-1	<50 || <50	LCS-5	101%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	86615-1	<100 || <100	LCS-5	99%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	86615-1	150 || <100	LCS-5	115%
TRH>C_{10}-C_{16}	mg/kg	50	Org-003	<50	86615-1	<50 || <50	LCS-5	101%
TRH>C_{10} - C_{16} less Naphthalene (F2)	mg/kg	50	Org-003	[NT]	86615-1	<50 || <50	[NR]	[NR]
TRH>C_{16}-C_{34}	mg/kg	100	Org-003	<100	86615-1	160 || 110 || RPD: 37	LCS-5	99%
TRH>C_{34}-C_{40}	mg/kg	100	Org-003	<100	86615-1	<100 || <100	LCS-5	115%
Surrogate o-Terphenyl	%		Org-003	101	86615-1	119 || 98 || RPD: 19	LCS-5	112%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			05/03/2013	86615-1	05/03/2013 || 05/03/2013	LCS-5	05/03/2013
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	108%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	116%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	96%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	101%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	100%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	LCS-5	102%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	86615-1	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	86615-1	0.08 || 0.05 || RPD: 46	LCS-5	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Benzo(a)pyrene TEQ	mg/kg	0.5	Org-012 subset	[NT]	86615-1	<0.5 || <0.5	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	115	86615-1	127 || 108 || RPD: 16	LCS-5	113%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			06/03/2013	86615-1	06/03/2013 || 06/03/2013	LCS-5	06/03/2013
HCB	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	107%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	115%
Heptachlor	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	107%
delta-BHC	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	119%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	112%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	86615-1	0.4 || 0.6 || RPD: 40	LCS-5	108%
Dieldrin	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || 0.1	LCS-5	107%
Endrin	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	LCS-5	113%
pp-DDD	mg/kg	0.1	Org-005	<0.1	86615-1	0.8 || 1.3 || RPD: 48	LCS-5	96%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	86615-1	0.5 || 0.8 || RPD: 46	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	86615-1	0.2 || 0.2 || RPD: 0	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	86615-1	0.3 || 0.4 || RPD: 29	LCS-5	121%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	107	86615-1	119 || 93 || RPD: 25	LCS-5	103%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			06/03/2013	86615-1	06/03/2013 || 06/03/2013	LCS-5	06/03/2013
Diazinon	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	LCS-5	109%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	LCS-5	106%
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	86615-1	<0.1 || <0.1	LCS-5	104%
Surrogate TCMX	%		Org-008	107	86615-1	119 || 93 || RPD: 25	LCS-5	105%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-5	04/03/2013
Date analysed	-			06/03/2013	86615-1	06/03/2013 || 06/03/2013	LCS-5	06/03/2013
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	LCS-5	114%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	86615-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	107	86615-1	119 || 93 || RPD: 25	LCS-5	104%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-1	04/03/2013
Date analysed	-			04/03/2013	86615-1	04/03/2013 || 04/03/2013	LCS-1	04/03/2013
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	86615-1	240 || 140 || RPD: 53	LCS-1	94%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	86615-1	<0.4 || <0.4	LCS-1	98%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	86615-1	17 || 18 || RPD: 6	LCS-1	97%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	86615-1	84 || 70 || RPD: 18	LCS-1	97%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	86615-1	140 || 110 || RPD: 24	LCS-1	96%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	86615-1	<0.1 || <0.1	LCS-1	76%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	86615-1	9 || 4 || RPD: 77	LCS-1	97%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	86615-1	190 || 160 || RPD: 17	LCS-1	97%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL BTEX in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base || Duplicate || %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			01/03/2013	[NT]	[NT]	LCS-W1	01/03/2013
Date analysed	-			03/03/2013	[NT]	[NT]	LCS-W1	03/03/2013
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	109%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	108%
Surrogate Dibromofluoromethane	%		Org-016	103	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	101	[NT]	[NT]	LCS-W1	99%
Surrogate 4-BFB	%		Org-016	97	[NT]	[NT]	LCS-W1	99%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	05/03/2013 || 05/03/2013	86615-3	05/03/2013
TRHC$_6$ - C$_9$	mg/kg	86615-19	<25 || <25	86615-3	92%
TRHC$_6$ - C$_{10}$	mg/kg	86615-19	<25 || <25	86615-3	92%
vTPH C$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	86615-19	<25 || <25	[NR]	[NR]
Benzene	mg/kg	86615-19	<0.2 || <0.2	86615-3	95%
Toluene	mg/kg	86615-19	<0.5 || <0.5	86615-3	91%
Ethylbenzene	mg/kg	86615-19	<1 || <1	86615-3	84%
m+p-xylene	mg/kg	86615-19	<2 || <2	86615-3	94%
o-Xylene	mg/kg	86615-19	<1 || <1	86615-3	96%
naphthalene	mg/kg	86615-19	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	86615-19	103 || 106 || RPD: 3	86615-3	102%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	06/03/2013 || 06/03/2013	86615-3	06/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	86615-19	<50 || <50	86615-3	84%
TRHC$_{15}$ - C$_{28}$	mg/kg	86615-19	<100 || <100	86615-3	83%
TRHC$_{29}$ - C$_{36}$	mg/kg	86615-19	<100 || <100	86615-3	98%
TRH>C$_{10}$-C$_{16}$	mg/kg	86615-19	<50 || <50	86615-3	84%
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	86615-19	<50 || <50	[NR]	[NR]
TRH>C$_{16}$-C$_{34}$	mg/kg	86615-19	<100 || <100	86615-3	83%
TRH>C$_{34}$-C$_{40}$	mg/kg	86615-19	<100 || <100	86615-3	98%
Surrogate o-Terphenyl	%	86615-19	93 || 114 || RPD: 20	86615-3	96%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	05/03/2013 || 05/03/2013	86615-3	05/03/2013
Naphthalene	mg/kg	86615-19	<0.1 || <0.1	86615-3	109%
Acenaphthylene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	86615-19	<0.1 || <0.1	86615-3	112%
Phenanthrene	mg/kg	86615-19	<0.1 || <0.1	86615-3	93%
Anthracene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	86615-19	0.1 || <0.1	86615-3	98%
Pyrene	mg/kg	86615-19	0.1 || <0.1	86615-3	93%
Benzo(a)anthracene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	86615-19	<0.1 || <0.1	86615-3	100%
Benzo(b+k)fluoranthene	mg/kg	86615-19	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	86615-19	0.07 || 0.05 || RPD: 33	86615-3	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Benzo(a)pyrene TEQ	mg/kg	86615-19	<0.5 || <0.5	[NR]	[NR]
Surrogate p-Terphenyl-d$_{14}$	%	86615-19	109 || 118 || RPD: 8	86615-3	105%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	06/03/2013 || 06/03/2013	86615-3	06/03/2013
HCB	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	86615-19	<0.1 || <0.1	86615-3	104%
gamma-BHC	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	86615-19	<0.1 || <0.1	86615-3	111%
Heptachlor	mg/kg	86615-19	<0.1 || <0.1	86615-3	106%
delta-BHC	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	86615-19	<0.1 || <0.1	86615-3	108%
Heptachlor Epoxide	mg/kg	86615-19	<0.1 || <0.1	86615-3	111%
gamma-Chlordane	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	86615-19	<0.1 || <0.1	86615-3	108%
Dieldrin	mg/kg	86615-19	<0.1 || <0.1	86615-3	108%
Endrin	mg/kg	86615-19	<0.1 || <0.1	86615-3	112%
pp-DDD	mg/kg	86615-19	<0.1 || <0.1	86615-3	107%
Endosulfan II	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	86615-19	<0.1 || <0.1	86615-3	121%
Methoxychlor	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	86615-19	102 || 115 || RPD: 12	86615-3	95%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	06/03/2013 || 06/03/2013	86615-3	06/03/2013
Diazinon	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Dimethoate	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos-methyl	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Ronnel	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	86615-19	<0.1 || <0.1	86615-3	105%
Fenitrothion	mg/kg	86615-19	<0.1 || <0.1	86615-3	100%
Bromophos-ethyl	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	86615-19	<0.1 || <0.1	86615-3	101%
Surrogate TCMX	%	86615-19	102 || 115 || RPD: 12	86615-3	101%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	06/03/2013 || 06/03/2013	86615-3	06/03/2013
Arochlor 1016	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Arochlor 1221	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Arochlor 1232	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Arochlor 1242	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Arochlor 1248	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Arochlor 1254	mg/kg	86615-19	<0.1 || <0.1	86615-3	108%
Arochlor 1260	mg/kg	86615-19	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	86615-19	102 || 115 || RPD: 12	86615-3	104%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Date analysed	-	86615-19	04/03/2013 || 04/03/2013	86615-3	04/03/2013
Arsenic	mg/kg	86615-19	700 || 600 || RPD: 15	86615-3	#
Cadmium	mg/kg	86615-19	<0.4 || <0.4	86615-3	85%
Chromium	mg/kg	86615-19	20 || 18 || RPD: 11	86615-3	87%
Copper	mg/kg	86615-19	130 || 230 || RPD: 56	86615-3	96%
Lead	mg/kg	86615-19	100 || 100 || RPD: 0	86615-3	112%
Mercury	mg/kg	86615-19	0.1 || 0.2 || RPD: 67	86615-3	83%
Nickel	mg/kg	86615-19	5 || 5 || RPD: 0	86615-3	82%
Zinc	mg/kg	86615-19	250 || 200 || RPD: 22	86615-3	84%

Report Comments:

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteriae has been exceeded for 86615-1 for As, Ni. Therefore a triplicate result has been issued as laboratory sample number 86615-34.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteriae has been exceeded for 86615-19 for Cu. Therefore a triplicate result has been issued as laboratory sample number 86615-35.

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

Asbestos:
Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.

Asbestos ID was analysed by Approved Identifier:	Alex Tam
Asbestos ID was authorised by Approved Signatory:	Lulu Guo

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 batched 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 and 10-140% for SVOC and speciated phenols is acceptable.

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Cameron Hollands

Sample log in details:

Your reference:	**E26305K, St Ives**
Envirolab Reference:	**86615**
Date received:	01/03/13
Date results expected to be reported:	**8/03/13**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	32 Soils, 1 Water
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack
Sampling Date Provided:	YES

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
Envirolab Services Pty Ltd
12 Ashley Street
Chatswood NSW 2067
Phone: (02) 99106200
Fax: (02) 99106201

Attention: Aileen

EIS Job Number: E 26305K

Date Results Required: 5 days

Sheet 1 / 2

FROM:
Environmental Investigation Services
Rear 115 Wicks Road
Macquarie Park NSW 2113
Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact:

Project: Proposed RACF
Location: ST. IVES
Sampler: DS/CH

Sample Preservation:
In esky on ice

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 13	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	Package #3
28/2/13	1	BH101	0-0.1	Glass jar + Asb Bag	0	FILL		X										
	2	↓	0.5-0.95	Glass jar + Asb Bag	0	Silty CLAY												
	3	BH102	0-0.1	Glass jar + Asb Bag	0	FILL		X										
	4	↓	0.5-0.95	Glass jar + Asb Bag	0	SILTY CLAY												
	5	BH103	0.0-0.2	Glass jar + Asb Bag	0	FILL		X										
	6	↓	0.5-0.95	Glass jar + Asb Bag	0	SILTY CLAY												
	7	BH104	0-0.2	Glass jar + Asb Bag	0	FILL		X										
	8	↓	0.5-0.95	Glass jar + Asb Bag	0	SILTY CLAY												X
	9	BH105	0.0-0.2	Glass jar + Asb Bag	0	FILL		X										
	10	↓	0.5-0.95	Glass jar + Asb Bag	0	SILTY CLAY												X
	11	BH106	0-0.2	Glass jar + Asb Bag	0	FILL		X										
	12	↓	0.5-0.95	Glass jar + Asb Bag	0	SILTY CLAY												
	13	BH107	0.1-0.3	Glass jar + Asb Bag	0	FILL		X										
	14	↓	0.5-0.7	Glass jar + Asb Bag	0	SILTY CLAY												
	15	BH108	0.2-0.6	Glass jar + Asb Bag	0	SILTY CLAY												
	16	↓	0.6-0.75	Glass jar + [illegible]	0	SILTY CLAY												
	17	BH109	0-0.2	Glass jar + Asb Bag	0	FILL		X										
	18	↓	0.4-0.6	Glass jar + [illegible]	0	SILTY CLAY												
	19	BH110	0.0-0.1	Glass jar + Asb Bag	0	FILL		X										
	20	↓	0.4-0.5	Glass jar + [illegible]	0	SILTY CLAY												
	21	BH111	0-0.05	Glass jar + Asb Bag	0	FILL		X										
	22	↓	0.05-0.1	Glass jar + Asb Bag	0	FILL		X										
	23	↓	0.4-0.6	Glass jar + [illegible]	0	SILTY CLAY												X
	24	BH112	0.0-0.05	Glass jar + Asb Bag	0	FILL		X										
	25		0.3-0.5	Glass jar + [illegible]	0	SILTY CLAY												

ENVIROLAB

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

Job No: 86615

Date Received: 8/2/13
Time Received: 14:50
Received by: D.F
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):

Relinquished By:	Date:	Time:	Received By:	
Cameron Hollands	1/3/13	PM	Daniel Ford	1/3/13 14:50

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E 26305K Date Results Required: 5 days. Sheet 2 / 2	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Cameron Hollands

Project: Prop. RACF
Location: ST. Ives
Sampler: DS / CH

Sample Preservation: In esky on ice ✓

Tests Required

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 13	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	Package #3
	26	BH113	0.0–0.1	Glass jar + Asb Bag	0	Silty Sandy GRAVEL												
	27	↓	0.3–0.5	Glass jar + ~~Asb Bag~~	0	Silty CLAY												
	28	BH114	0.0–0.1	Glass jar + Asb Bag	0	Fill		X										
	29		0.3–0.4	Glass jar + ~~Asb Bag~~	0	Silty CLAY												X
	30	DUP1	–	Glass jar + ~~Asb Bag~~	–	Soil												X
	31	DUP2	–	Glass jar + ~~Asb Bag~~	–	Soil												
		DUP3	–	Glass jar + ~~Asb Bag~~	–	Soil												X
	32	FB1	–	Glass jar + ~~Asb Bag~~	–	Sand						X						
	33	RS1	–	Glass jar + ~~Asb Bag~~	–	water						X						
		~~TS1~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
		~~MW101~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
		~~MW102~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
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				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														

Remarks (comments/detection limits required):
Please send Dup 3 to NMI for package #3 (TPH/BTEX, PAHs & HM)

Relinquished By:	Date:	Time:	Received By:	
Cameron hollands	1/3/13	PM	Daniel Ford	14:50 1/3/13

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

CERTIFICATE OF ANALYSIS 86615-A

Client:
Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E26305K, St Ives**
No. of samples:	Additional Testing on 14 Soils
Date samples received / completed instructions received	01/03/13 / 11/03/13

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	18/03/13 / 18/03/13
Date of Preliminary Report:	Not issued

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

Results Approved By:

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Hinoko Miyazaki
Chemist

Matt Mansfield
Approved Signatory

vTRH(C6-C10)/BTEXN in Soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	13/05/2013
Date analysed	-	15/03/2013
TRHC$_6$ - C$_9$	mg/kg	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25
Benzene	mg/kg	<0.2
Toluene	mg/kg	<0.5
Ethylbenzene	mg/kg	<1
m+p-xylene	mg/kg	<2
o-Xylene	mg/kg	<1
naphthalene	mg/kg	<1
Surrogate aaa-Trifluorotoluene	%	99

svTRH (C10-C40) in Soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	13/03/2013
Date analysed	-	13/03/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100
TRHC$_{29}$ - 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
Surrogate o-Terphenyl	%	85

PAHs in Soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	13/03/2013
Date analysed	-	14/03/2013
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+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
Benzo(a)pyrene TEQ	mg/kg	<0.5
Surrogate p-Terphenyl-d_{14}	%	93

Organochlorine Pesticides in soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	13/03/2013
Date analysed	-	16/03/2013
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
Surrogate TCMX	%	100

PCBs in Soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	13/03/2013
Date analysed	-	16/03/2013
Arochlor 1016	mg/kg	<0.1
Arochlor 1221	mg/kg	<0.1
Arochlor 1232	mg/kg	<0.1
Arochlor 1242	mg/kg	<0.1
Arochlor 1248	mg/kg	<0.1
Arochlor 1254	mg/kg	<0.1
Arochlor 1260	mg/kg	<0.1
Surrogate TCLMX	%	100

Acid Extractable metals in soil		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date digested	-	13/03/2013
Date analysed	-	13/03/2013
Arsenic	mg/kg	80
Cadmium	mg/kg	<0.4
Chromium	mg/kg	19
Copper	mg/kg	11
Lead	mg/kg	110
Mercury	mg/kg	<0.1
Nickel	mg/kg	6
Zinc	mg/kg	71

Moisture		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date prepared	-	13/03/13
Date analysed	-	14/03/13
Moisture	%	19

Asbestos ID - soils		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date analysed	-	18/03/2013
Sample mass tested	g	Approx 50g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg
Trace Analysis	-	No respirable fibres detected

Metals in TCLP USEPA1311						
Our Reference:	UNITS	86615-A-1	86615-A-5	86615-A-7	86615-A-9	86615-A-11
Your Reference	----------	BH101	BH103	BH104	BH105	BH106
Depth	----------	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013	14/03/2013
Date analysed	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013	14/03/2013
pH of soil for fluid# determ.	pH units	5.9	5.4	5.6	5.5	7.6
pH of soil for fluid # determ. (acid)	pH units	1.6	1.6	1.6	1.6	1.7
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	5.0	5.0	5.0	5.0	5.0
Arsenic in TCLP	mg/L	0.3	0.2	1	[NA]	[NA]
Lead in TCLP	mg/L	0.07	[NA]	2.8	0.2	1.6

Metals in TCLP USEPA1311						
Our Reference:	UNITS	86615-A-13	86615-A-15	86615-A-17	86615-A-19	86615-A-21
Your Reference	----------	BH107	BH108	BH109	BH110	BH111
Depth	----------	0.1-0.3	0.2-0.6	0.0-0.2	0.0-0.1	0.0-0.5
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013	14/03/2013
Date analysed	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013	14/03/2013
pH of soil for fluid# determ.	pH units	7.9	7.9	7.3	6.7	8.7
pH of soil for fluid # determ. (acid)	pH units	1.7	1.5	1.6	1.6	1.7
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	4.9	5.0	5.0	5.0	5.0
Arsenic in TCLP	mg/L	[NA]	0.1	0.7	1.1	0.4
Cadmium in TCLP	mg/L	[NA]	<0.01	[NA]	[NA]	[NA]
Chromium in TCLP	mg/L	[NA]	<0.01	[NA]	[NA]	[NA]
Lead in TCLP	mg/L	0.7	0.05	0.03	[NA]	0.2
Mercury in TCLP	mg/L	[NA]	<0.0005	[NA]	[NA]	[NA]
Nickel in TCLP	mg/L	[NA]	<0.02	[NA]	[NA]	[NA]

Metals in TCLP USEPA1311					
Our Reference:	UNITS	86615-A-22	86615-A-24	86615-A-28	86615-A-29
Your Reference	----------	BH111	BH112	BH114	BH114
Depth	----------	0.05-0.1	0.0-0.05	0.0-0.1	0.2-0.4
Date Sampled		28/02/2013	28/02/2013	28/02/2013	28/02/2013
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013
Date analysed	-	14/03/2013	14/03/2013	14/03/2013	14/03/2013
pH of soil for fluid# determ.	pH units	6.6	6.0	6.8	6.6
pH of soil for fluid # determ. (acid)	pH units	1.5	1.6	1.6	1.6
Extraction fluid used	-	1	1	1	1
pH of final Leachate	pH units	5.0	5.0	5.0	5.1
Arsenic in TCLP	mg/L	0.6	[NA]	0.4	1.9
Lead in TCLP	mg/L	[NA]	0.05	0.6	[NA]

PAHs in TCLP (USEPA 1311)		
Our Reference:	UNITS	86615-A-15
Your Reference	----------	BH108
Depth	----------	0.2-0.6
Date Sampled		28/02/2013
Type of sample		Soil
Date extracted	-	14/03/2013
Date analysed	-	15/03/2013
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(b+k)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Surrogate p-Terphenyl-d_{14}	%	124

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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 4 hours.
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-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Org-012 subset	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/03/2013	[NT]	[NT]	LCS-7	13/03/2013
Date analysed	-			15/03/2013	[NT]	[NT]	LCS-7	15/03/2013
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-7	111%
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-7	111%
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	25	Org-016	[NT]	[NT]	[NT]	[NR]	[NR]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-7	114%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-7	108%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-7	105%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-7	115%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-7	116%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	91	[NT]	[NT]	LCS-7	93%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/03/2013	[NT]	[NT]	LCS-5	13/03/2013
Date analysed	-			13/03/2013	[NT]	[NT]	LCS-5	13/03/2013
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	89%
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	90%
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	79%
TRH>C_{10}-C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-5	89%
TRH>C_{10} - C_{16} less Naphthalene (F2)	mg/kg	50	Org-003	[NT]	[NT]	[NT]	[NR]	[NR]
TRH>C_{16}-C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	90%
TRH>C_{34}-C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-5	79%
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	LCS-5	84%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/03/2013	[NT]	[NT]	LCS-5	13/03/2013
Date analysed	-			14/03/2013	[NT]	[NT]	LCS-5	14/03/2013
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	82%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	86%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	83%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	84%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	87%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-5	80%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-5	93%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene TEQ	mg/kg	0.5	Org-012 subset	[NT]	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	93	[NT]	[NT]	LCS-5	89%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/03/2013	[NT]	[NT]	LCS-5	13/03/2013
Date analysed	-			16/03/2013	[NT]	[NT]	LCS-5	16/03/2013
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	80%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	91%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	86%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	80%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	87%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	87%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	91%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	81%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	94%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-5	88%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	90	[NT]	[NT]	LCS-5	86%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			13/03/2013	[NT]	[NT]	LCS-5	13/03/2013
Date analysed	-			16/03/2013	[NT]	[NT]	LCS-5	16/03/2013
Arochlor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-5	84%
Arochlor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	90	[NT]	[NT]	LCS-5	92%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			13/03/2013	[NT]	[NT]	LCS-1	13/03/2013
Date analysed	-			13/03/2013	[NT]	[NT]	LCS-1	13/03/2013
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	LCS-1	93%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-1	92%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	98%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	98%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	95%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	LCS-1	95%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	98%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	LCS-1	97%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Asbestos ID - soils	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/03/2013	86615-A-17	14/03/2013 || 14/3/2013	LCS-W1	18/03/2013
Date analysed	-			18/03/2013	86615-A-17	14/03/2013 || 14/3/2013	LCS-W1	18/03/2013
Arsenic in TCLP	mg/L	0.05	Metals-020 ICP-AES	<0.05	86615-A-17	0.7 || 0.7 || RPD: 0	LCS-W1	108%
Cadmium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	[NT]	[NT]	LCS-W1	102%
Chromium in TCLP	mg/L	0.01	Metals-020 ICP-AES	<0.01	[NT]	[NT]	LCS-W1	103%
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	86615-A-17	0.03 || 0.03 || RPD: 0	LCS-W1	100%
Mercury in TCLP	mg/L	0.0005	Metals-021 CV-AAS	<0.0005	[NT]	[NT]	LCS-W1	96%
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	LCS-W1	105%

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			14/03/2013	[NT]	[NT]	LCS-W1	14/03/2013
Date analysed	-			15/03/2013	[NT]	[NT]	LCS-W1	15/03/2013
Naphthalene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	84%
Acenaphthylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	92%
Phenanthrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	93%
Anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	93%
Pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	96%
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Chrysene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	88%
Benzo(b+k)fluoranthene in TCLP	mg/L	0.002	Org-012 subset	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	LCS-W1	90%
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012 subset	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012	138	[NT]	[NT]	LCS-W1	107%

Report Comments:

Asbestos in soil sample 86615-A-15:
Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.

Asbestos ID was analysed by Approved Identifier:	Paul Ching
Asbestos ID was authorised by Approved Signatory:	Lulu Guo

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 batched 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 and 10-140% for SVOC and speciated phenols is acceptable.

Aileen Hie

From: Rhian Morgan
Sent: Monday, 11 March 2013 10:13 AM
To: Aileen Hie
Subject: FW: Request for additinoal sample analysis: registration '86615 - E26305K, St Ives'

Regards,

Rhian Morgan | Reporting Supervisor | Envirolab Services Pty Ltd

Great Chemistry.Great Service

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 F 612 9910 6201
mailto:rmorgan@envirolab.com.au | http://www.envirolab.com.au

-----Original Message-----
From: Cameron Hollands [mailto:chollands@jkgroup.net.au]
Sent: Monday, 11 March 2013 10:14
To: Rhian Morgan
Subject: Request for additinoal sample analysis: registration '86615 - E26305K, St Ives'

Rhian,

Please analyse the additional on standard TAT:

5 BH108(0.2-0.4m): package 12a

1 BH101 (0.0-0.1): Arsenic & lead
5 BH103 (0.0-0.2): Arsenic
7 BH104 (0.0-0.2): Arsenic & lead
9 BH105 (0.0-0.2): lead
11 BH106 (0.0-0.2): lead
13 BH107 (0.1-0.3): lead
17 BH109 (0.0-0.2): Arsenic & lead
19 BH110 (0.0-0.1): Arsenic
21 BH111 (0.0-0.5): Arsenic & lead
22 BH111 (0.05-0.1): Arsenic
24 BH112 (0.0-0.05): lead
28 BH114 (0.0-0.1): Arsenic & lead
29 BH114 (0.2-0.4): Arsenic

Envirolab Ref: 86615A
Due: 18/3/13
Std TAT.

Regards,

Cameron Hollands
Environmental Scientist

Environmental Investigation Services
CONSULTING ENVIRONMENTAL ENGINEERS AND SCIENTISTS
Tel: 02 9888 5000
Fax: 02 9888 5001
PO Box 976
North Ryde BC NSW 1670

Envirolab Services Pty Ltd
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12 Ashley St Chatswood NSW 2067
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CERTIFICATE OF ANALYSIS 86620

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E26305K, St Ives**		
No. of samples:	4 Waters		
Date samples received / completed instructions received	01/03/13	/	01/03/13

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	8/03/13	/	7/03/13
Date of Preliminary Report:	Not issued		

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

Results Approved By:

Nancy Zhang
Chemist

Rhian Morgan
Reporting Supervisor

Nick Sarlamis
Inorganics Supervisor

vTRH(C6-C10)/BTEXN in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water	86620-3 DUP1 28/02/2013 Water	86620-4 TS1 25/02/2013 Water
Date extracted	-	01/03/2013	01/03/2013	01/03/2013	01/03/2013
Date analysed	-	02/03/2013	02/03/2013	02/03/2013	02/03/2013
TRHC$_6$ - C$_9$	µg/L	<10	<10	<10	[NA]
TRHC$_6$ - C$_{10}$	µg/L	<10	<10	<10	[NA]
TRHC$_6$ - C$_{10}$ less BTEX (F1)	µg/L	<10	<10	<10	[NA]
Benzene	µg/L	<1	<1	<1	88%
Toluene	µg/L	<1	<1	<1	91%
Ethylbenzene	µg/L	<1	<1	<1	94%
m+p-xylene	µg/L	<2	<2	<2	95%
o-xylene	µg/L	<1	<1	<1	96%
Naphthalene	µg/L	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	101	101	102	100
Surrogate toluene-d8	%	100	101	101	100
Surrogate 4-BFB	%	98	98	99	101

svTRH (C10-C40) in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water	86620-3 DUP 1 28/02/2013 Water
Date extracted	-	05/03/2013	05/03/2013	05/03/2013
Date analysed	-	05/03/2013	05/03/2013	05/03/2013
TRHC$_{10}$ - C$_{14}$	µg/L	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	µg/L	<100	<100	<100
TRHC$_{29}$ - 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	%	94	92	93

PAHs in Water Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water
Date extracted	-	05/03/2013	05/03/2013
Date analysed	-	06/03/2013	06/03/2013
Naphthalene	µg/L	<1	<1
Acenaphthylene	µg/L	<1	<1
Acenaphthene	µg/L	<1	<1
Fluorene	µg/L	<1	<1
Phenanthrene	µg/L	<1	<1
Anthracene	µg/L	<1	<1
Fluoranthene	µg/L	<1	<1
Pyrene	µg/L	<1	<1
Benzo(a)anthracene	µg/L	<1	<1
Chrysene	µg/L	<1	<1
Benzo(b+k)fluoranthene	µg/L	<2	<2
Benzo(a)pyrene	µg/L	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5
Surrogate p-Terphenyl-d_{14}	%	103	101

OCP in water - low level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water
Date extracted	-	05/03/2013	05/03/2013
Date analysed	-	05/03/2013	05/03/2013
HCB	µg/L	<0.02	<0.01
alpha-BHC	µg/L	<0.02	<0.01
gamma-BHC	µg/L	0.02	<0.01
beta-BHC	µg/L	<0.02	<0.01
Heptachlor	µg/L	<0.02	<0.01
delta-BHC	µg/L	<0.02	<0.01
Aldrin	µg/L	0.03	<0.01
Heptachlor Epoxide	µg/L	<0.02	<0.01
gamma-Chlordane	µg/L	<0.02	<0.01
alpha-Chlordane	µg/L	<0.02	<0.01
Endosulfan I	µg/L	0.30	<0.01
pp-DDE	µg/L	<0.02	<0.01
Dieldrin	µg/L	0.04	<0.01
Endrin	µg/L	<0.02	<0.01
pp-DDD	µg/L	<0.02	<0.01
Endosulfan II	µg/L	<0.02	<0.01
DDT	µg/L	<0.02	<0.01
Endrin Aldehyde	µg/L	<0.02	<0.01
Endosulfan Sulphate	µg/L	0.28	<0.01
Methoxychlor	µg/L	<0.02	<0.010
Surrogate TCMX	%	68	61

OP Pesticides in water LL Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water
Date extracted	-	05/03/2013	05/03/2013
Date analysed	-	05/03/2013	05/03/2013
Diazinon	µg/L	<0.01	<0.01
Dimethoate	µg/L	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.01	<0.01
Ronnel	µg/L	<0.01	<0.01
Chlorpyriphos	µg/L	<0.01	<0.01
Fenitrothion	µg/L	<0.01	<0.01
Bromophos ethyl	µg/L	<0.01	<0.01
Ethion	µg/L	<0.01	<0.01
Surrogate TCMX	%	68	61

PCBs in Water - Low Level Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water
Date extracted	-	05/03/2013	05/03/2013
Date analysed	-	05/03/2013	05/03/2013
Arochlor 1016	µg/L	<0.1	<0.1
Arochlor 1221	µg/L	<0.1	<0.1
Arochlor 1232	µg/L	<0.1	<0.1
Arochlor 1242	µg/L	<0.1	<0.1
Arochlor 1248	µg/L	<0.1	<0.1
Arochlor 1254	µg/L	<0.1	<0.1
Arochlor 1260	µg/L	<0.1	<0.1
Surrogate TCLMX	%	68	61

HM in water - dissolved Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water	86620-3 DUP 1 28/02/2013 Water
Date prepared	-	04/03/2013	04/03/2013	04/03/2013
Date analysed	-	04/03/2013	04/03/2013	04/03/2013
Arsenic-Dissolved	µg/L	3	<1	3
Cadmium-Dissolved	µg/L	0.2	<0.1	0.2
Chromium-Dissolved	µg/L	3	1	2
Copper-Dissolved	µg/L	2	1	2
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	3	1	3
Zinc-Dissolved	µg/L	63	35	64

Miscellaneous Inorganics Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	86620-1 MW101 28/02/2013 Water	86620-2 MW102 28/02/2013 Water
Date prepared	-	02/03/2013	02/03/2013
Date analysed	-	02/03/2013	02/03/2013
pH	pH Units	5.8	5.7
Electrical Conductivity	µS/cm	230	180
Calcium - Dissolved	mg/L	11	4.8
Magnesium - Dissolved	mg/L	3.3	2.0
Hardness	mgCaCO3 /L	42	20

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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-013	Water samples are analysed directly by purge and trap GC-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 draft Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell and dedicated meter, in accordance with APHA 22nd ED 2510 and Rayment & Lyons.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			01/03/2013	[NT]	[NT]	LCS-W1	01/03/2013
Date analysed	-			03/03/2013	[NT]	[NT]	LCS-W1	03/03/2013
TRHC$_6$ - C$_9$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	108%
TRHC$_6$ - C$_{10}$	µg/L	10	Org-016	<10	[NT]	[NT]	LCS-W1	108%
TRHC$_6$ - C$_{10}$ less BTEX (F1)	µg/L	10	Org-016	10	[NT]	[NT]	[NR]	[NR]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	107%
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	LCS-W1	109%
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	LCS-W1	108%
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NR]	[NR]
Surrogate Dibromofluoromethane	%		Org-016	103	[NT]	[NT]	LCS-W1	99%
Surrogate toluene-d8	%		Org-016	101	[NT]	[NT]	LCS-W1	99%
Surrogate 4-BFB	%		Org-016	97	[NT]	[NT]	LCS-W1	95%

QUALITY CONTROL svTRH (C10-C40) in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Date analysed	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
TRHC$_{10}$ - C$_{14}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	88%
TRHC$_{15}$ - C$_{28}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	122%
TRHC$_{29}$ - C$_{36}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	89%
TRH>C$_{10}$ - C$_{16}$	µg/L	50	Org-003	<50	[NT]	[NT]	LCS-W1	88%
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	µg/L	50	Org-003	50	[NT]	[NT]	[NR]	[NR]
TRH>C$_{16}$ - C$_{34}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	122%
TRH>C$_{34}$ - C$_{40}$	µg/L	100	Org-003	<100	[NT]	[NT]	LCS-W1	89%
Surrogate o-Terphenyl	%		Org-003	101	[NT]	[NT]	LCS-W1	89%

QUALITY CONTROL PAHs in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Date analysed	-			06/03/2013	[NT]	[NT]	LCS-W1	06/03/2013
Naphthalene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	89%
Acenaphthylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluorene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	93%
Phenanthrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	88%
Anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	88%
Pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	89%
Benzo(a)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Chrysene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	84%
Benzo(b+k)fluoranthene	µg/L	2	Org-012 subset	<2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	LCS-W1	92%
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	µg/L	1	Org-012 subset	<1	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene TEQ	µg/L	5	Org-012 subset	[NT]	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d_{14}	%		Org-012 subset	104	[NT]	[NT]	LCS-W1	102%

QUALITY CONTROL OCP in water - low level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Date analysed	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
HCB	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	95%
gamma-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	102%
Heptachlor	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	83%
delta-BHC	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	85%
Heptachlor Epoxide	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	107%
gamma-Chlordane	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	111%
Dieldrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	111%
Endrin	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	114%
pp-DDD	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	112%
Endosulfan II	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
DDT	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	µg/L	0.01	Org-005	<0.01	[NT]	[NT]	LCS-W1	108%
Methoxychlor	µg/L	0.01	Org-005	<0.010	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	92	[NT]	[NT]	LCS-W1	73%

QUALITY CONTROL OP Pesticides in water LL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Date analysed	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Diazinon	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NR]	[NR]
Dimethoate	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos-methyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NR]	[NR]
Ronnel	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	LCS-W1	105%
Fenitrothion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	LCS-W1	103%
Bromophos ethyl	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	[NR]	[NR]
Ethion	µg/L	0.01	Org-008	<0.01	[NT]	[NT]	LCS-W1	98%
Surrogate TCMX	%		Org-008	92	[NT]	[NT]	LCS-W1	83%

QUALITY CONTROL PCBs in Water - Low Level	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Date analysed	-			05/03/2013	[NT]	[NT]	LCS-W1	05/03/2013
Arochlor 1016	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1221	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1232	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1242	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1248	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Arochlor 1254	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	LCS-W1	96%
Arochlor 1260	µg/L	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	92	[NT]	[NT]	LCS-W1	82%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			04/03/2013	86620-3	04/03/2013 || 04/03/2013	LCS-W1	04/03/2013
Date analysed	-			04/03/2013	86620-3	04/03/2013 || 04/03/2013	LCS-W1	04/03/2013
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	3 || 3 || RPD: 0	LCS-W1	88%
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	86620-3	0.2 || 0.2 || RPD: 0	LCS-W1	89%
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	2 || 2 || RPD: 0	LCS-W1	86%
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	2 || 2 || RPD: 0	LCS-W1	86%
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	<1 || <1	LCS-W1	87%
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	86620-3	<0.05 || [N/T]	LCS-W1	96%

QUALITY CONTROL HM in water - dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	3 || 3 || RPD: 0	LCS-W1	89%
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	86620-3	64 || 64 || RPD: 0	LCS-W1	84%
QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			04/03/2013	86620-1	02/03/2013 || 02/03/2013	LCS-W1	04/03/2013
Date analysed	-			04/03/2013	86620-1	02/03/2013 || 02/03/2013	LCS-W1	04/03/2013
pH	pH Units		Inorg-001	[NT]	86620-1	5.8 || [N/T]	LCS-W1	102%
Electrical Conductivity	µS/cm	1	Inorg-002	<1	86620-1	230 || [N/T]	LCS-W1	106%
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	86620-1	11 || 11 || RPD: 0	LCS-W1	103%
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	86620-1	3.3 || 3.4 || RPD: 3	LCS-W1	102%
Hardness	mgCaCO3/L	3		3.0	86620-1	42 || 43 || RPD: 2	[NR]	[NR]

Report Comments:

OCP (in water)PQL has been raised due to interference from analytes(other than those being tested)in the sample/s.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 batched 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 and 10-140% for SVOC and speciated phenols is acceptable.

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Cameron Hollands

Sample log in details:

Your reference:	**E26305K, St Ives**
Envirolab Reference:	**86620**
Date received:	01/03/13
Date results expected to be reported:	**8/03/13**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	4 Waters
Turnaround time requested:	Standard
Temperature on receipt	Cool
Cooling Method:	Ice Pack
Sampling Date Provided:	YES

Comments:

Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

TO:
Envirolab Services Pty Ltd
12 Ashley St, Chatswood 2067

Phone: (02) 9910 6200
Fax: (02) 9910 6201

Attention: Aileen

Date Results Required: 5 days

SAMPLE AND CHAIN OF CUSTODY FORM

EIS Job Number: E 26305K

Sheet 1 / 1

FROM:
Environmental Investigation Services

Rear 115 Wicks Road
Macquarie Park NSW 2113

Phone: (02) 9888 5000
Fax: (02) 9888 5004

Contact: Cameron Hollands

Project: Proposed RACF
Location: St. Ives
Sampler: JS/CH

Sample Preservation:
In esky on ice

Date Sampled	Time Sampled	Location	Sample/ Borehole Number	Sample Container	PID (ppm/ Odour)	Sample Description	Tests Required: Combo 3	Heavy metals	TPH/BTEX	~~VOCs~~ PCBs	PAHs	pH / EC / Hardness	OP/OC	BTEX		Comments/Detection Limits Required
28/2/13	PM	MW101-1		3 x ½ L Amber Bottle 2 x BTEX Vials 1 x HDPE Plastic Bottle	/	water		X	X	X	X	X	X			
"	"	MW102-2		" "	/	" "		X	X	X	X	X	X			
"	"	DUP1-3		" "	/	" "		X	X							
25/2/13	—	TS1-4		1 x BTEX vial	/	" "								X		

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

Job No: 86620
Date Received: 1/3/13
Time Received: 1450
Received by: JHi
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished By:	Date: 1/3/13	Received By:
Cameron Hollands	Time: PM	JHi
Relinquished By:	Date:	Received By:
	Time:	

Remarks:

All analysis PQLs to ANZECC (2000) Detection Limits Please

PCBs, OP & OC → All at low level

REPORT OF ANALYSIS

Client	: Environmental Investigation Services	Job No.	: ENVI78/130304
	115 WICKS ROAD	Quote No.	: QT-01783
	MACQUARIE PARK NSW 2113	Order No.	: E26305K
		Date Sampled	:
		Date Received	: 4-MAR-2013
Attention	: CAMERON HOLLANDS	Sampled By	: CLIENT
Project Name	: PROP. RACF		
Your Client Services Manager	: RICHARD COGHLAN	Phone	: (02) 94490161

Lab Reg No.	Sample Ref	Sample Description
N13/005751	DUP3	SOIL ST.IVES PROJECT: PROP. RACF JOB: E26305K

Lab Reg No.		N13/005751				
Sample Reference	Units	DUP3				Method
Polycyclic Aromatic Hydrocarbons						
Naphthalene	mg/kg	< 0.5				NGCMS_1111
Acenaphthylene	mg/kg	< 0.5				NGCMS_1111
Acenaphthene	mg/kg	< 0.5				NGCMS_1111
Fluorene	mg/kg	< 0.5				NGCMS_1111
Phenanthrene	mg/kg	< 0.5				NGCMS_1111
Anthracene	mg/kg	< 0.5				NGCMS_1111
Fluoranthene	mg/kg	< 0.5				NGCMS_1111
Pyrene	mg/kg	< 0.5				NGCMS_1111
Benz(a)anthracene	mg/kg	< 0.5				NGCMS_1111
Chrysene	mg/kg	< 0.5				NGCMS_1111
Benzo(b)&(k)fluoranthene	mg/kg	< 1				NGCMS_1111
Benzo(a)pyrene	mg/kg	< 0.5				NGCMS_1111
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5				NGCMS_1111
Dibenzo(a,h)anthracene	mg/kg	< 0.5				NGCMS_1111
Benzo(g,h,i)perylene	mg/kg	< 0.5				NGCMS_1111
Surrogate: TER-D14	%REC	104				NGCMS_1111
BTEX						
Benzene	mg/kg	< 0.5				NGCMS_1121
Toluene	mg/kg	< 0.5				NGCMS_1121
Ethyl Benzene	mg/kg	< 0.5				NGCMS_1121
m, p - Xylene	mg/kg	< 1				NGCMS_1121
o - Xylene	mg/kg	< 0.5				NGCMS_1121
Surrogate: TOL-D8	%REC	103				NGCMS_1121
Total Petroleum Hydrocarbons						
TPH C6 - C9	mg/kg	< 25				NGCMS_1121
TPH C10 - C14	mg/kg	< 50				NGCMS_1112
TPH C15 - C28	mg/kg	< 100				NGCMS_1112
TPH C29 - C36	mg/kg	< 100				NGCMS_1112
Surrogate: TOL-D8	%REC	103				NGCMS_1121
Dates						
Date extracted		5-MAR-2013				

REPORT OF ANALYSIS

Lab Reg No.		N13/005751				
Sample Reference	Units	DUP3				Method
Dates						
Date analysed		6-MAR-2013				

Luke Baker, Analyst
Organics - NSW
Accreditation No. 198

11-MAR-2013

Lab Reg No.		N13/005751				
Sample Reference	Units	DUP3				Method
Trace Elements						
Arsenic	mg/kg	660				NT2_49
Cadmium	mg/kg	< 0.5				NT2_49
Chromium	mg/kg	21				NT2_49
Copper	mg/kg	190				NT2_49
Lead	mg/kg	260				NT2_49
Mercury	mg/kg	< 0.2				NT2_49
Nickel	mg/kg	11				NT2_49
Zinc	mg/kg	230				NT2_49
Total Solids	%	80.0				NT2_49

Ling Shuang Lu, Analyst
Inorganics - NSW
Accreditation No. 198

11-MAR-2013

All results are expressed on a dry weight basis.

REPORT OF ANALYSIS

This Report supersedes reports: RN961057 RN961065

Australian Government

National Measurement Institute

SAMPLE RECEIPT NOTIFICATION

To: Environmental Investigation Services
Attn: CAMERON HOLLANDS
From: Laboratory Services Unit
Date: 5-MAR-2013
Email:

If you have any queries or wish to make any adjustments to analyses requested, please contact Susanne Neuman immediately on 02 9449 0181

Project: PROP. RACF
Order No.: E26305K
NMI Job No: ENVI78/130304
Total Number of Samples: 1
Date received by NMI: 4-MAR-2013
Estimated Report Date: 11-MAR-2013

LRNs	Sample Ref	Description
N13/005751	DUP3	SOIL ST.IVES PROJECT: PROP. RACF JOB: E26305K

Comments:

ALL OK

Samples received Chilled

NMI quotation number provided Not Applicable
Complete documentation received Yes

If NO please contact Susanne Neuman on 02 9449 0181 to clarify. Note: incomplete or unclear information about samples or required testing will delay the start of the analysis work

Unless advised otherwise sample analysis will commence regardless of integrity issues
Relevant non-conformances will be recorded on the final report.

ENV178/130304
Due 11/3/13
NH

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
Envirolab Services Pty Ltd 12 Ashley Street Chatswood NSW 2067 Phone: (02) 99106200 Fax: (02) 99106201 Attention: Aileen	EIS Job Number: E 26305K Date Results Required: 5 days Sheet 2 / 3	Environmental Investigation Services Rear 115 Wicks Road Macquarie Park NSW 2113 Phone: (02) 9888 5000 Fax: (02) 9888 5004 Contact: Cameron Hollands

Project: Prop. RACF
Location: ST. Ives
Sampler: DS / CH

Tests Required

Sample Preservation: In esky on ice ✓

N13/005751

Date Sampled	Lab Ref:	Borehole/ Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 6	Combo 6a	Combo 13	8 Metals	TPH	BTEX	PAHs	OCP/OPP/ PCBs	Asbestos	TCLP 6 Metals	TCLP PAHs	Package #3
	26	BH113	0.0–0.1	Glass jar + Asb Bag	0	Silty Sandy Gravel												
	27	↓	0.3–0.5	Glass jar + ~~Asb Bag~~	0	Silty Clay												
	28	BH114	0.0–0.1	Glass jar + Asb Bag	0	Fill		X										
	29		0.3–0.4	Glass jar + ~~Asb Bag~~	0	Silty Clay												X
	30	DUP1	–	Glass jar + ~~Asb Bag~~	–	Soil												X
	31	DUP2	–	Glass jar + Asb Bag	–	Soil												
		DUP3	–	Glass jar + ~~Asb Bag~~	–	Soil												X
	32	FB1	–	Glass jar + ~~Asb Bag~~	–	Sand						X						
	33	RS1	–	Glass jar + ~~Asb Bag~~	–	water						X						
		~~TS1~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
		~~MW101~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
		~~MW102~~	~~–~~	Glass jar + ~~Asb Bag~~	~~–~~													
				Glass jar + Asb Bag														
				Glass jar + Asb Bag														
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				Glass jar + Asb Bag														
				Glass jar + Asb Bag														

Remarks (comments/detection limits required):
Please send Dup 3 to NMI for package #3 (TPH/BTEX, PAHs + HM)

Relinquished By:	Date:	Time:	Received By:	
Cameron Hollands	1/3/13	PM	Daniel Ford	15:15 1/3/13

Relinquished: Sophie
EIS
04/03.

RECEIVED
04 MAR 2013
BY: A.B 15:00
e.

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: Environmental Investigation Services

NMI QA Report No: ENVI78/130304 **Sample Matrix:** Solid

Analyte	Method	LOR	Blank	Sample Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
Organics Section								
BTEX								
Benzene	NGCMS_1121	0.5	<0.5	NA	NA	NA	89	NA
Toluene	NGCMS_1121	0.5	<0.5	NA	NA	NA	86	NA
Ethyl Benzene	NGCMS_1121	0.5	<0.5	NA	NA	NA	85	NA
m, p - Xylene	NGCMS_1121	1	<1	NA	NA	NA	86	NA
o-Xylene	NGCMS_1121	0.5	<0.5	NA	NA	NA	84	NA
TPH								
TPH C6-C9	NGCMS_1121	25	<25	NA	NA	NA	86	NA
TPH C10-C14	NGCMS_1112	50	<50	NA	NA	NA	102	NA
TPH C15-C28	NGCMS_1112	100	<100	NA	NA	NA	104	NA
TPH C29-C36	NGCMS_1112	100	<100	NA	NA	NA	-	NA
Surrogate: TOL-D8	NGCMS_1121	-	-	NA	NA	NA	99	NA
PAH								
Naphthalene	NGCMS_1111	0.5	<0.5	NA	NA	NA	100	NA
Acenaphthylene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Acenaphthene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Fluorene	NGCMS_1111	0.5	<0.5	NA	NA	NA	100	NA
Phenanthrene	NGCMS_1111	0.5	<0.5	NA	NA	NA	100	NA
Anthracene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Fluoranthene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Pyrene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Benz[a]anthracene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Chrysene	NGCMS_1111	0.5	<0.5	NA	NA	NA	100	NA
Benzo[b]&[k]fluoranthene	NGCMS_1111	1	<1	NA	NA	NA	-	NA
Benzo[a]pyrene	NGCMS_1111	0.5	<0.5	NA	NA	NA	109	NA
Indeno[1_2_3-cd]pyrene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Dibenz[ah]anthracene	NGCMS_1111	0.5	<0.5	NA	NA	NA	91	NA
Benzo[ghi]perylene	NGCMS_1111	0.5	<0.5	NA	NA	NA	-	NA
Surrogate: TER-D14	NGCMS_1111	-	-	NA	NA	NA	103	NA

Results expressed in percentage (%) or mg/kg wherever appropriate.
Acceptable Spike recovery is 70-130% (BTEX and TPH C6-C9); 50-150% (PAH and TPH C10-C36)
Maximum acceptable RPDs on spikes and duplicates is 40%.
'NA ' = Not Applicable.
RPD= Relative Percentage Difference.

Signed:

Danny Slee
Organics Manager, NMI-North Ryde

Date: **8/03/2013**

Australian Government

National Measurement Institute

QUALITY ASSURANCE REPORT

Client: Environmental Investigation Services

NMI QA Report No: ENVI78/130304T1 **Sample Matrix:** Soil

Analyte	Method	LOR	Blank	Duplicates			Recoveries	
				Sample	Duplicate	RPD	LCS	Matrix Spike
		mg/kg	mg/kg	mg/kg	mg/kg	%	%	%
Inorganics Section								**N13/005751**
Arsenic	NT2.49	0.5	<0.5	640	680	6	101	94
Cadmium	NT2.49	0.5	<0.5	NA	NA	NA	96	NA
Chromium	NT2.49	0.5	<0.5	20	21	5	98	89
Copper	NT2.49	0.5	<0.5	170	210	21	100	93
Lead	NT2.49	0.5	<0.5	250	260	4	103	93
Mercury	NT2.49	0.2	<0.2	NA	NA	NA	98	NA
Nickel	NT2.49	0.5	<0.5	13	8.8	39	99	90
Zinc	NT2.49	0.5	<0.5	220	240	9	91	96

Filename = K:\Inorganics\Quality System\QA Reports\TE\QAR2013\Soil\

Legend:
Acceptable recovery is 75-120%.
Acceptable RPDs on duplicates is 44% at concentrations >5 times LOR. Greater RPD may be expected at <5 times LOR.
LOR = Limit Of Reporting ND = Not Determined
RPD = Relative Percent Difference NA = Not Applicable
LCS = Laboratory Control Sample.
#: Spike level is less than 50% of the sample's concentration, hence the recovery data is not reliable.
**: reference value not available
Comments:
Results greater than ten times LOR have been rounded to two significant figures.
This report shall not be reproduced except in full.

Signed:

Dr Michael Wu
Inorganics, NMI-North Ryde
Date: **11/03/2013**

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

CERTIFICATE OF ANALYSIS 114380

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E26305K, St Ives**
No. of samples:	1 water , 32 soils
Date samples received / completed instructions received	08/08/14 / 08/08/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	15/08/14 / 14/08/14
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

Organochlorine Pesticides in soil						
Our Reference:	UNITS	114380-1	114380-2	114380-5	114380-7	114380-9
Your Reference	----------	DUPA	DUPB	BH201	BH202	BH203
Depth	----------	-	-	0.1-0.3	0-0.2	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
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	0.3	<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	0.5	<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
Surrogate TCMX	%	76	76	74	76	75

Organochlorine Pesticides in soil						
Our Reference:	UNITS	114380-10	114380-12	114380-13	114380-15	114380-17
Your Reference	----------	BH203	BH204	BH205	BH206	BH206
Depth	----------	0.2-0.4	0.1-0.3	0-0.2	0-0.15	0.6-0.8
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
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
Surrogate TCMX	%	74	78	73	74	85

Organochlorine Pesticides in soil						
Our Reference:	UNITS	114380-19	114380-20	114380-21	114380-23	114380-24
Your Reference	----------	BH207	BH207	BH208	BH208	BH209
Depth	----------	0.4-0.6	0.8-1.0	0-0.15	0.5-0.7	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
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	0.3
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
Surrogate TCMX	%	76	73	75	76	75

Organochlorine Pesticides in soil						
Our Reference:	UNITS	114380-25	114380-26	114380-28	114380-29	114380-30
Your Reference	----------	BH209	BH210	BH210	BH211	BH211
Depth	----------	0.2-0.4	0-0.1	0.5-0.7	0-0.1	0.2-0.4
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
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	0.3	<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	0.5	<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
Surrogate TCMX	%	75	77	75	75	75

Organochlorine Pesticides in soil			
Our Reference:	UNITS	114380-32	114380-33
Your Reference	----------	BH212	BH212
Depth	----------	0.2-0.4	0.6-0.8
Date Sampled		07/08/2014	07/08/2014
Type of sample		Soil	Soil
Date extracted	-	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	3.0	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Surrogate TCMX	%	75	75

Acid Extractable metals in soil						
Our Reference:	UNITS	114380-1	114380-2	114380-5	114380-7	114380-9
Your Reference	----------	DUPA	DUPB	BH201	BH202	BH203
Depth	----------	-	-	0.1-0.3	0-0.2	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Arsenic	mg/kg	5	180	1,600	110	30
Lead	mg/kg	240	230	39	880	110

Acid Extractable metals in soil						
Our Reference:	UNITS	114380-10	114380-12	114380-13	114380-15	114380-17
Your Reference	----------	BH203	BH204	BH205	BH206	BH206
Depth	----------	0.2-0.4	0.1-0.3	0-0.2	0-0.15	0.6-0.8
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Arsenic	mg/kg	10	1,200	10	130	4
Lead	mg/kg	24	49	280	94	37

Acid Extractable metals in soil						
Our Reference:	UNITS	114380-19	114380-20	114380-21	114380-23	114380-24
Your Reference	----------	BH207	BH207	BH208	BH208	BH209
Depth	----------	0.4-0.6	0.8-1.0	0-0.15	0.5-0.7	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Arsenic	mg/kg	170	60	150	<4	120
Lead	mg/kg	1,600	36	270	98	180

Acid Extractable metals in soil						
Our Reference:	UNITS	114380-25	114380-26	114380-28	114380-29	114380-30
Your Reference	----------	BH209	BH210	BH210	BH211	BH211
Depth	----------	0.2-0.4	0-0.1	0.5-0.7	0-0.1	0.2-0.4
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Arsenic	mg/kg	20	220	8	370	4
Lead	mg/kg	13	340	28	2,000	20

Acid Extractable metals in soil			
Our Reference:	UNITS	114380-32	114380-33
Your Reference	----------	BH212	BH212
Depth	----------	0.2-0.4	0.6-0.8
Date Sampled		07/08/2014	07/08/2014
Type of sample		Soil	Soil
Date digested	-	11/08/2014	11/08/2014
Date analysed	-	11/08/2014	11/08/2014
Arsenic	mg/kg	<4	<4
Lead	mg/kg	79	9

Moisture						
Our Reference:	UNITS	114380-1	114380-2	114380-5	114380-7	114380-9
Your Reference	----------	DUPA	DUPB	BH201	BH202	BH203
Depth	----------	-	-	0.1-0.3	0-0.2	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
Moisture	%	21	4.6	19	8.7	9.0

Moisture						
Our Reference:	UNITS	114380-10	114380-12	114380-13	114380-15	114380-17
Your Reference	----------	BH203	BH204	BH205	BH206	BH206
Depth	----------	0.2-0.4	0.1-0.3	0-0.2	0-0.15	0.6-0.8
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
Moisture	%	16	18	6.5	7.7	22

Moisture						
Our Reference:	UNITS	114380-19	114380-20	114380-21	114380-23	114380-24
Your Reference	----------	BH207	BH207	BH208	BH208	BH209
Depth	----------	0.4-0.6	0.8-1.0	0-0.15	0.5-0.7	0-0.15
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
Moisture	%	15	22	7.1	21	5.2

Moisture						
Our Reference:	UNITS	114380-25	114380-26	114380-28	114380-29	114380-30
Your Reference	----------	BH209	BH210	BH210	BH211	BH211
Depth	----------	0.2-0.4	0-0.1	0.5-0.7	0-0.1	0.2-0.4
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	11/08/2014	11/08/2014	11/08/2014	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014	12/08/2014	12/08/2014	12/08/2014
Moisture	%	22	4.3	21	8.4	22

Moisture			
Our Reference:	UNITS	114380-32	114380-33
Your Reference	----------	BH212	BH212
Depth	----------	0.2-0.4	0.6-0.8
Date Sampled		07/08/2014	07/08/2014
Type of sample		Soil	Soil
Date prepared	-	11/08/2014	11/08/2014
Date analysed	-	12/08/2014	12/08/2014
Moisture	%	13	21

OCP in water Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- ----------	 114380-3 Rinsate - 07/08/2014 Water
Date extracted	-	12/08/2014
Date analysed	-	12/08/2014
HCB	µg/L	<0.2
alpha-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
beta-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endosulfan II	µg/L	<0.2
pp-DDT	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Surrogate TCMX	%	92

Metals in Water - Dissolved		
Our Reference:	UNITS	114380-3
Your Reference	----------	Rinsate
Depth	----------	-
Date Sampled		07/08/2014
Type of sample		Water
Date digested	-	11/08/2014
Date analysed	-	12/08/2014
Arsenic - Dissolved	mg/L	<0.05
Lead - Dissolved	mg/L	<0.03

Method ID	Methodology Summary
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			11/08/2014	114380-1	11/08/2014 || 11/08/2014	114380-2	11/08/2014
Date analysed	-			12/08/2014	114380-1	12/08/2014 || 12/08/2014	114380-2	12/08/2014
HCB	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	89%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	102%
Heptachlor	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	91%
delta-BHC	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	98%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	92%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	91%
Dieldrin	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	99%
Endrin	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	60%
pp-DDD	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	93%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	114380-2	97%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	114380-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	75	114380-1	76 || 77 || RPD: 1	114380-2	73%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			11/08/2014	114380-1	11/08/2014 || 11/08/2014	114380-2	11/08/2014
Date analysed	-			11/08/2014	114380-1	11/08/2014 || 11/08/2014	114380-2	11/08/2014
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	114380-1	5 || 5 || RPD: 0	114380-2	130%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	114380-1	240 || 240 || RPD: 0	114380-2	#
QUALITY CONTROL OCP in water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			12/08/2014	[NT]	[NT]	LCS-W	12/08/2014
Date analysed	-			12/08/2014	[NT]	[NT]	LCS-W	12/08/2014
HCB	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	108%
gamma-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
beta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	103%
Heptachlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	106%
delta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Aldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	112%
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	109%
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan I	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDE	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	107%
Dieldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	106%
Endrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	103%
pp-DDD	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	111%
Endosulfan II	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
pp-DDT	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	LCS-W	117%
Methoxychlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	83	[NT]	[NT]	LCS-W	87%

QUALITY CONTROL Metals in Water - Dissolved	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date digested	-			11/08/2014	[NT]	[NT]	LCS-W	11/08/2014
Date analysed	-			12/08/2014	[NT]	[NT]	LCS-W	12/08/2014
Arsenic - Dissolved	mg/L	0.05	Metals-020 ICP-AES	<0.05	[NT]	[NT]	LCS-W	101%
Lead - Dissolved	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W	102%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	114380-19	11/08/2014 || 11/08/2014	LCS-6	11/08/2014
Date analysed	-	114380-19	12/08/2014 || 12/08/2014	LCS-6	12/08/2014
HCB	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	114380-19	<0.1 || <0.1	LCS-6	92%
gamma-BHC	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	114380-19	<0.1 || <0.1	LCS-6	107%
Heptachlor	mg/kg	114380-19	<0.1 || <0.1	LCS-6	89%
delta-BHC	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	114380-19	<0.1 || <0.1	LCS-6	100%
Heptachlor Epoxide	mg/kg	114380-19	<0.1 || <0.1	LCS-6	96%
gamma-Chlordane	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	114380-19	<0.1 || <0.1	LCS-6	94%
Dieldrin	mg/kg	114380-19	<0.1 || <0.1	LCS-6	108%
Endrin	mg/kg	114380-19	<0.1 || <0.1	LCS-6	98%
pp-DDD	mg/kg	114380-19	<0.1 || <0.1	LCS-6	104%
Endosulfan II	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	114380-19	<0.1 || <0.1	LCS-6	119%
Methoxychlor	mg/kg	114380-19	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	114380-19	76 || 75 || RPD: 1	LCS-6	75%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	114380-19	11/08/2014 || 11/08/2014	LCS-10	11/08/2014
Date analysed	-	114380-19	11/08/2014 || 11/08/2014	LCS-10	11/08/2014
Arsenic	mg/kg	114380-19	170 || 160 || RPD: 6	LCS-10	97%
Lead	mg/kg	114380-19	1600 || 1200 || RPD: 29	LCS-10	99%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	114380-32	11/08/2014 || 11/08/2014
Date analysed	-	114380-32	12/08/2014 || 12/08/2014
HCB	mg/kg	114380-32	<0.1 || <0.1
alpha-BHC	mg/kg	114380-32	<0.1 || <0.1
gamma-BHC	mg/kg	114380-32	<0.1 || <0.1
beta-BHC	mg/kg	114380-32	<0.1 || <0.1
Heptachlor	mg/kg	114380-32	<0.1 || <0.1
delta-BHC	mg/kg	114380-32	<0.1 || <0.1
Aldrin	mg/kg	114380-32	<0.1 || <0.1
Heptachlor Epoxide	mg/kg	114380-32	<0.1 || <0.1
gamma-Chlordane	mg/kg	114380-32	<0.1 || <0.1
alpha-chlordane	mg/kg	114380-32	<0.1 || <0.1
Endosulfan I	mg/kg	114380-32	<0.1 || <0.1
pp-DDE	mg/kg	114380-32	3.0 || 2.4 || RPD: 22
Dieldrin	mg/kg	114380-32	<0.1 || <0.1
Endrin	mg/kg	114380-32	<0.1 || <0.1
pp-DDD	mg/kg	114380-32	<0.1 || <0.1
Endosulfan II	mg/kg	114380-32	<0.1 || <0.1
pp-DDT	mg/kg	114380-32	<0.1 || <0.1
Endrin Aldehyde	mg/kg	114380-32	<0.1 || <0.1
Endosulfan Sulphate	mg/kg	114380-32	<0.1 || <0.1
Methoxychlor	mg/kg	114380-32	<0.1 || <0.1
Surrogate TCMX	%	114380-32	75 || 75 || RPD: 0

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date digested	-	114380-32	11/08/2014 || 11/08/2014
Date analysed	-	114380-32	11/08/2014 || 11/08/2014
Arsenic	mg/kg	114380-32	<4 || <4
Lead	mg/kg	114380-32	79 || 58 || RPD: 31

Report Comments:

METALS_S # Percent recovery is not possible to report due to the high concentration of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 and 10-140% for SVOC 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.

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

SAMPLE RECEIPT ADVICE

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC NSW 1670

ph: 02 9888 5000
Fax: 02 9888 5001

Attention: Cameron Hollands

Sample log in details:

Your reference:	**E26305K, St Ives**
Envirolab Reference:	**114380**
Date received:	08/08/14
Date results expected to be reported:	**15/08/14**

Samples received in appropriate condition for analysis:	YES
No. of samples provided	1 water , 32 soils
Turnaround time requested:	Standard
Temperature on receipt (°C)	7.7
Cooling Method:	Ice
Sampling Date Provided:	YES

Comments:

If there is sufficient sample after testing, samples will be held for the following time frames from date of receipt of samples:
Water samples - 1 month
Soil and other solid samples - 2 months
Samples collected in canisters - 1 week. Canisters will then be cleaned.
All other samples are not retained after analysis
If you require samples to be retained for longer periods then retention fees will apply as per our pricelist.

Contact details:

Please direct any queries to Aileen Hie or Jacinta Hurst
ph: 02 9910 6200 fax: 02 9910 6201
email: ahie@envirolabservices.com.au or jhurst@envirolabservices.com.au

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SSERVICES PTY LTD	EIS Job Number: E26305K	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHFIELD 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: 1/2	Attention: Cameron Hollands
Attention: Aileen		

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

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Arsenic	Lead	OC Pesticides
7/08/2014	1.	Dup A	–	G	0	Soil	X	X	X
7/08/2014	2.	Dup B	–	G	0	Soil	X	X	X
7/08/2014	3.	Rinsate	–	G	–	Water	X	X	X
7/08/2014	4.	BH201	0 – 0.1	G	0	Fill			
7/08/2014	5.	" 201	0.1 – 0.3	G	0	Fill	X	X	X
7/08/2014	6.	" 201	0.4 – 0.6	G	0	Silty clay			
7/08/2014	7.	BH202	0 – 0.2	G	0	Fill	X	X	X
7/08/2014	8.	" "	0.4 – 0.6	G	0	Silty clay			
7/08/2014	9.	BH203	0 – 0.15	G	0	Fill	X	X	X
7/08/2014	10.	" "	0.2 – 0.4	G	0	Silty clay	X	X	X
7/08/2014	11.	BH204	0 – 0.1	G	0	Fill			
7/08/2014	12.	" "	0.1 – 0.3	G	0	Fill	X	X	X
7/08/2014	13.	BH205	0 – 0.2	G	0	Fill	X	X	X
7/08/2014	14.	" "	0.3 – 0.5	G	0	Fill			
7/08/2014	15.	BH206	0 – 0.15	G	0	Fill	X	X	X
7/08/2014	16.	" "	0.2 – 0.4	G	0	Fill			
7/08/2014	17.	" "	0.6 – 0.8	G	0	Silty clay	X	X	X
7/08/2014	18.	BH207	0 – 0.2	G	0	Fill			
7/08/2014	19.	" "	0.4 – 0.6	G	0	Fill	X	X	X
7/08/2014	20.	" "	0.8 – 1.0	G	0	Silty clay	X	X	X
7/08/2014	21.	BH208	0 – 0.15	G	0	Fill	X	X	X
7/08/2014	22.	" "	0.2 – 0.4	G	0	Fill			
7/08/2014	23.	" "	0.5 – 0.7	G	0	Silty clay	X	X	X
~~7/08/2014~~									

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

Job No: 114380

Date Received: 8.8.14

Time Received: 14:45

Received by: D.F.

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By: EIS / cameron hollands	Date: 8/8/14	Time: AM	Received By: DFORD, EIS	Date: 8-8.14

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SSERVICES PTY LTD 12 ASHFIELD STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen	EIS Job Number: E26305K Date Results Required: STANDARD Page: 2/2	ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: Cameron Hollands

Location: St Ives

Sampler: GF

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Arsenic	Lead	OC Pesticides
7/08/2014	24.	BH209	0 – 0.15	G	0	Fill	X	X	X
7/08/2014	25.	"	0.2 – 0.4	G	0	Silty clay	X	X	X
7/08/2014	26.	BH210	0 – 0.1	G	0	Fill	X	X	X
7/08/2014	27.	"	0.1 – 0.3	G	0	Fill			
7/08/2014	28.	"	0.5 – 0.7	G	0	Silty clay	X	X	X
7/08/2014	29.	BH211	0 – 0.1	G	0	Fill	X	X	X
7/08/2014	30.	"	0.2 – 0.4	G	0	Silty clay	X	X	X
7/08/2014	31.	BH212	0 – 0.1	G	0	Fill			
7/08/2014	32.	"	0.2 – 0.4	G	0	Fill	X	X	X
7/08/2014	33.	"	0.6 – 0.8	G	0	Silty clay	X	X	X
~~7/08/2014~~				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					
7/08/2014				G					

Remarks (comments/detection limits required):

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

Relinquished By: EIS / cameron hollands	Date: 8/8/14	Time: AM	Received By: D.Ford, EIS	Date: 8.8.14

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

CERTIFICATE OF ANALYSIS 114380-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference:	**E26305K, St Ives**
No. of samples:	Additional testing on 6 soils
Date samples received / completed instructions received	08/08/14 / 18/08/14

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	25/08/14 / 25/08/14
Date of Preliminary Report:	Not Issued

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

Results Approved By:

Jacinta Hurst
Laboratory Manager

Metals in TCLP USEPA1311						
Our Reference:	UNITS	114380-A-5	114380-A-7	114380-A-12	114380-A-19	114380-A-29
Your Reference	----------	BH201	BH202	BH204	BH207	BH211
Depth	----------	0.1-0.3	0-0.2	0.1-0.3	0.4-0.6	0-0.1
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/08/2014	20/08/2014	20/08/2014	20/08/2014	20/08/2014
Date analysed	-	21/08/2014	21/08/2014	21/08/2014	21/08/2014	21/08/2014
pH of soil for fluid# determ.	pH units	5.7	9.4	7.9	7.7	7.6
pH of soil for fluid # determ. (acid)	pH units	1.4	1.6	1.5	1.5	1.4
Extraction fluid used	-	1	1	1	1	1
pH of final Leachate	pH units	4.8	5.2	4.9	4.9	4.8
Arsenic in TCLP	mg/L	0.3	0.3	1.7	[NA]	0.4
Lead in TCLP	mg/L	[NA]	0.3	[NA]	1.7	3.8

Metals-ASLP Neutral (ICP-MS)						
Our Reference:	UNITS	114380-A-5	114380-A-7	114380-A-12	114380-A-19	114380-A-26
Your Reference	----------	BH201	BH202	BH204	BH207	BH210
Depth	----------	0.1-0.3	0-0.2	0.1-0.3	0.4-0.6	0-0.1
Date Sampled		07/08/2014	07/08/2014	07/08/2014	07/08/2014	07/08/2014
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	20/08/2014	20/08/2014	20/08/2014	20/08/2014	20/08/2014
Date analysed	-	21/08/2014	21/08/2014	21/08/2014	21/08/2014	21/08/2014
pH of final Leachate	pH units	5.2	8.9	7.3	7.4	6.9
Arsenic in ASLP	µg/L	1,600	230	9,300	[NA]	300
Lead in ASLP	µg/L	[NA]	400	[NA]	4,200	150

Metals-ASLP Neutral (ICP-MS)		
Our Reference:	UNITS	114380-A-29
Your Reference	----------	BH211
Depth	----------	0-0.1
Date Sampled		07/08/2014
Type of sample		Soil
Date extracted	-	20/08/2014
Date analysed	-	21/08/2014
pH of final Leachate	pH units	6.8
Arsenic in ASLP	µg/L	410
Lead in ASLP	µg/L	830

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using AS 4439 and USEPA 1311 and in house method INORG-004.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA 22nd ED, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-022 ICP-MS	Determination of various metals by ICP-MS following leaching using neutralised deionised water by AS 4439.3 - 1997.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2014	[NT]	[NT]	LCS-4	21/08/2014
Date analysed	-			21/08/2014	[NT]	[NT]	LCS-4	21/08/2014
Arsenic in TCLP	mg/L	0.05	Metals-020 ICP-AES	<0.05	[NT]	[NT]	LCS-4	101%
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-4	103%
QUALITY CONTROL Metals-ASLP Neutral (ICP-MS)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/08/2014	114380-A-5	20/08/2014 || 20/08/2014	LCS-1	21/08/2014
Date analysed	-			21/08/2014	114380-A-5	21/08/2014 || 21/08/2014	LCS-1	21/08/2014
Arsenic in ASLP	µg/L	1	Metals-022 ICP-MS	<1	114380-A-5	1600 || 1800 || RPD: 12	LCS-1	106%
Lead in ASLP	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	LCS-1	118%

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	114380-A-19	21/08/2014
Date analysed	-	[NT]	[NT]	114380-A-19	21/08/2014
Arsenic in TCLP	mg/L	[NT]	[NT]	[NR]	[NR]
Lead in TCLP	mg/L	[NT]	[NT]	114380-A-19	129%
QUALITY CONTROL Metals-ASLP Neutral (ICP-MS)	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	114380-A-7	21/08/2014
Date analysed	-	[NT]	[NT]	114380-A-7	21/08/2014
Arsenic in ASLP	µg/L	[NT]	[NT]	114380-A-7	102%
Lead in ASLP	µg/L	[NT]	[NT]	114380-A-7	#

Report Comments:

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

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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.

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 and 10-140% for SVOC 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.

Sample Reference	Sample Depth	ASLP	TCLP
BH201 - 5	0.1-0.3	Arsenic	Arsenic
BH202 - 7	0-0.2	Arsenic & lead	Arsenic & lead
BH204 - 12	0.1-0.3	Arsenic	Arsenic
BH207 - 19	0.4-0.6	Lead	Lead
BH210 - 26	0-0.1	Asenic & lead	NA
BH211 - 29	0-0.1	Asenic & lead	Asenic & lead

414380 A

std TAT

due 2/5/18.

APPENDIX C

Abbreviations, Sampling Protocols and QA/QC Definitions

ABBREVIATIONS

AEC	Area of Environmental Concern
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ALTPQL	All Less than PQL
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
BA/DA	Building Approval and Development Application
B(a)P	Benzo(a)pyrene
BGL	Below Ground Level
BH	Borehole
BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
CMP	Construction Management Plan
CSM	Conceptual Site Model
CT	Contamination Threshold
DBYD	Dial Before You Dig
DEC	Department of Environment and Conservation (now part of EPA)
DECC	Department of Environment and Climate Change (now part of EPA)
DECCW	Department of Environment, Climate Change and Water (now part of EPA)
DWE	NSW Department of Water and Energy
DO	Dissolved Oxygen
DP	Deposited Plan
DQIs	Data Quality Indicators
DQOs	Data Quality Objective
EC	Electrical Conductivity
Eh	Redox Potential
EILs	Ecological Investigation Levels
ENM	Excavated Natural Material
EMP	Environmental Management Plan
ESA	Environmental Site Assessment
FR	Field Rinsate
GAI	General Approvals of Immobilisation
GILs	Groundwater Investigation Levels
GPS	Global Positioning System
Hazmat	Hazardous Materials Assessment
HILs	Health Based Investigation Level
HM	Heavy Metals
HMTVs	Hardness Modified Trigger Values
LNAPLs	Light Non-Aqueous Phase Liquids
NATA	National Association of Testing Authorities
NDLR	Not Detected at Limit of Reporting
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
NSW EPA	Environmental Protection Authority of NSW
MGA	Map Grid of Australia
OCPs	Organochlorine Pesticides
OEH	NSW Office of Environment and Heritage
OPPs	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons

ABBREVIATIONS

PASS	Potential ASS
PCC	Potential Contaminants of Concern
PCBs	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
POEO	Protection of Environmental Operations
PPIL	Provisional Phyto-toxicity Investigation Levels
PQL	Practical Quantitation Limit
RAP	Remediation Action Plan
RL	Reduced Level
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SAQP	Sampling, Analysis and Quality Plan
SAS	Site Audit Statement
SCC	Specific Contamination Concentration
SD	Standard Deviation
SEPP	State Environmental Planning Policy
sPOCAS	suspension Peroxide Oxidation Combined Acidity and Sulfate
SPT	Standard Penetration Test
SVOCs	Semi-Volatile Organic Compounds
SWL	Standing Water Level
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TP	Test Pit
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TS	Trip Spike
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
UPSS	Underground Petroleum Storage Systems
UST	Underground Storage Tank
VENM	Virgin Excavated Natural Material
VOCs	Volatile Organic Compounds
WC	Waste Classification
WHS	Workplace, Health and Safety

SOIL AND GROUNDWATER SAMPLING PROTOCOLS

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

a) Prepare a test pit/borehole log.
b) 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 drill rig/excavator can operate in a safe manner.
c) Ensure all sampling equipment has been decontaminated prior to use.
d) Remove any surface debris from the immediate area of the sampling location.
e) Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possibly to prevent the loss of volatiles.If possible, fill the glass jars completely.
f) Collect samples for asbestos analysis and place in a zip-lock plastic bag.
g) Label the jar and/or bag 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).
h) Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurementsare 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.
i) Record the lithology of the sample and sample depth on the borehole/test pit log in accordance with AS1726-1993[21].
j) 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 AS 4482.1:2005, AS 4482.2:1999 and AS/NZS 5667.1:1998.
k) 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. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
l) Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

a) All of the equipment associated with the soil sampling procedure should be decontaminatedbetween every sampling location.
b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent (Decon 90)
   - Potable water
   - Stiff brushes
   - Plastic sheets
c) Ensure the decontamination materials are clean prior to proceeding with the decontamination.
d) Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
e) In the bucket containing the detergent scrub the sampling equipment until all the material attached to the equipment has been removed.
f) Rinse sampling equipment in the bucket containing potable water.

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

g) 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 that 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.

a) 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.

b) 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 casingand well.

c) Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dipmeter.The collar level should be taken (if required) during the site visit using a dumpy level and staff.

d) Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or 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:
   - Micropore filtration system or Stericup single-use filters (for heavy metals samples).
   - Filter paper for Micropore filtration system.
   - 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/T meters.
   - Plastic drums used for transportation of purged water.
   - Esky and ice.
   - Nitrile gloves.
   - Distilled water (for cleaning).
   - Electronic dip meter.
   - Micro-purge pump pack and pump head.
   - Air and water tubing for Micro-purge.
   - Groundwater sampling forms.

e) If single-use stericup filtration is not being used, clean the Micropore filtration systemthoroughly with distilled water prior to use and between each sample. Filter paper should bechanged between samples. 0.45um filter paper should be placed below the glassfibre filter paper in the filtration system.

f) Ensure all non-disposable sampling equipment is decontaminated or that new disposableequipment is available prior to any work commencing at a new location. The

procedure for decontamination of groundwaterequipment is outlined at the end of this section.

g) Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.

h) Groundwater samples are obtained from the monitoring wells using low flow/micro-purgesampling equipment to reduce the disturbance of the water column and loss of volatiles.

i) During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instrumentsto 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%.

j) All measurements are recorded on specific data sheets.

k) Once steady state conditions are considered to have been achieved, groundwater samples areobtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.

l) All samples are preserved in accordance with water sampling requirements detailed in theNEPM 1999 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice in accordance with AS/NZS 5667.1:1998.

m) Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

a) All of the equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.

b) The following equipment and materials are required for the decontamination procedure:
   - Phosphate free detergent.
   - Potable water.
   - Distilled water
   - Plastic Sheets or bulk bags (plastic bags)

c) Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.

d) Flush potable water and detergent through pump head. Wash sampling equipment and pump headusing brushes in the bucket containing detergent until all materials attached to the equipment are removed.

e) Flush pump head with distilled water.

f) Change water and detergent solution after each sampling location.

g) Rinse sampling equipment in the bucket containing distilled water.

h) Place cleaned equipment on clean plastic sheets.

i) 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,* (H. Keith 1991[23]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) and 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 (MDL) 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). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. 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.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

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:

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

[23] *Environmental Sampling and Analysis, A Practical Guide*, Keith, H, 1991 (Keith 1991)

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;
- 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 (eg. 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 artifacts and interferences that may arise during sampling 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%.

$$\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Concentration of Spike Added}} \times 100$$

Surrogate & Trip 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 and Trip 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:

$$\frac{(D1 - D2)}{\{(D1 + D2)/2\}} \times 100$$

APPENDIX D

Equipment Calibration Records

AES ACTIVE ENVIRONMENTAL SOLUTIONS

Calibration and Service Report – PID

Company:	Environmental Investigation Services	**Manufacturer:**	RAE Systems	**Serial #:**	110-006735
Contact:	Katie McGrath	**Instrument:**	MiniRAE 2000	**Asset #:**	EIS1
Address:	Rear 115 Wicks Road	**Model:**	PGM-7600	**Part #:**	002
	MACQUARIE PARK, NSW 2113	**Configuration:**	VOC	**Sold:**	-
Phone:	02 9888 5000	**Wireless:**	-	**Last Cal:**	5/05/2012
Fax:	02 9888 5004	**Network ID:**	-	**Job #:**	AES.020046
Email:	kmcgrath@jkgroup.net.au	**Unit ID:**	-	**Cal Spec:**	STD
				Order #:	7.11.12KM

Item	Test	Pass/Fail	Comments	Part Code	S/W
Battery	NiCd, NiMH, Dry cell, Li Ion	x	Replaced faulty rechargeable battery	0123051000E	1
Charger	Charger, Power supply	-			
	Cradle	-			
Pump	Flow	✓	>450mL/min		
Filter	Filter, fitting, etc	x	New Filter Fitted	002-3022-000	1
Alarms	Audible, visual, vibration	✓			
Display	Operation	✓			
Switches	Operation	✓			
PCB	Operation	✓			
Connectors	Condition	✓			
Firmware	Version	✓	Version: 2.00		
Datalogger	Operation	✓			
Lamp Housing	Condition/operation	✓			
Monitor Housing	Condition	✓			
Case	Condition/Type	✓			
Sensors					
PID		✓			
Lamp		✓			
				Calibration	1
				Labour	0.5

Engineer's Report

Replaced faulty Rechargeable Battery Pack. Pump Flow Checked.
Lamp and Sensor Cleaned. New Filter Fitted.
Unit Calibrated, Unit Serviceable.

Calibration Certificate

Sensor	Type	Serial No:	Span Gas	Concentration	Traceability Lot #	CF	Reading	
							Zero	Span
PID	10.6ev	021689	Isobutylene	100ppm	S21306		0	100

Calibrated/Repaired by: **Bill Knobel** Date: **2 November 2012** Next Due: **2 May 2013**

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