COOK COVE

Consulting Earth Scientists

DETAILED ENVIRONMENTAL SITE ASSESSMENT
19 MARSH STREET, ARNCLIFFE, NSW
COOKS COVE DEVELOPMENT ZONE
PREPARED FOR COOK COVE INLET PTY LTD

CES Document Reference: CES130608-BP-AT

Written by: Dr V. Arias

SC41156 & CEnvP (General) 682

Reviewed by: T. Goodbody

Authorised by: D. Lowe

Client: Cook Cove Inlet Pty Ltd
Level 3, 161 Castlereagh Street
Sydney, NSW, 2000

Date: 16 February 2023

Telephone: 02 8569 2200 • **Fax**: 02 9552 4399 • Level 1, Suite 3
55-65 Grandview Street • Pymble NSW 2073 • Australia • www.consultingearth.com.au

Document Control

DETAILED ENVIRONMENTAL SITE ASSESSMENT
19 MARSH STREET, ARNCLIFFE, NSW
COOKS COVE DEVELOPMENT ZONE
PREPARED FOR COOK COVE INLET PTY LTD

CES Document Reference: CES130608-BP-AT

Distribution Register

Hard Copy	Digital copy	Recipient	Location
	1	Peter Bettridge	Cook Cove Inlet Pty Ltd
	1	CES Library	CES Pty Ltd

The Distribution Register identifies the recipients of issued copies of this report.

Revision Register

Revision Number	Revision Date	Description
0.0	20.07.2018	19 Marsh Street, Arncliffe – Detailed Environmental Site Investigation
1.0	16/02/2023	19 Marsh Street, Arncliffe – Detailed Environmental Site Investigation

The revision register tracks changes to the document.

The latest revision of this document supersedes all previous revisions. It is the responsibility of the recipient to ensure that superseded revisions of this document are removed from circulation.

Documents are only valid if they are signed, original documents issued by CES Pty Ltd. CES Pty Ltd does not accept any liability for actions taken based upon incomplete copies of this document.

DETAILED ENVIRONMENTAL SITE ASSESSMENT
19 MARSH STREET, ARNCLIFFE, NSW
COOKS COVE DEVELOPMENT ZONE
PREPARED FOR COOK COVE INLET PTY LTD

CES Document Reference: CES130608-BP-AT

Executive Summary

This report comprises a Detailed Environmental Site Assessment (DESA) of 19 Marsh Street, Arncliffe, New South Wales (NSW), legally described as Lot 31 in Deposited Plan (DP) 1231486 (formerly described as Lot 10 DP570900 and Lot 101 DP 1231954) (the site). The site consists of approximately 4,400 square metres (0.4 ha) and is immediately bounded by neighbouring Lots (Lot 103 of DP 1231954, Lot 13 of DP 570900, and Lot 14 of DP 213314) and Marsh Street to the south and west, the Cooks River immediately bordering the north-eastern boundary, and infrastructure and facilities of Rowers Recreation Club. The site was unoccupied and secured with fencing and electronic gating at the time of the investigation. The site has been previously used as car parking facilities and as a temporary construction compound for the WestConnex New M5 tunnelling works. The findings of this report are based on an intrusive investigation of the underlying soil and groundwater.

The objective of the DESA is to investigate the Contaminants of Potential Concern (CoPC) identified in the corresponding Preliminary Environmental Site Assessment (PESA) (CES, 2017) and determine whether the site in its present state, without further investigation or remediation, is suitable for the proposed mixed (SP4 Enterprise and RE1 Public Recreation) use of the site.

To achieve the objective, CES has completed the following scope of works:

- Undertake drilling of five (5) boreholes to target depths ranging 5 m to 30 m, in addition to five (5) boreholes excavated by hand auger;
- Photoionization Detection (PID) screening of samples collected every 1 m to determine potential presence of volatiles;
- Sampling of fill materials and soil for laboratory analysis;
- Acid sulfate soil screening in three boreholes to a maximum depth of 2 m
- Installation of groundwater monitoring wells in three of the 5 drilled boreholes to a depth of 6 m to allow for determination of groundwater flow and to collect groundwater samples;
- One-off groundwater sampling event to chemically characterise the groundwater encountered at the site;

- Laboratory analysis of fifteen (15) soil samples for a general suite of analytes (Total Recoverable Hydrocarbons (TRH), monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene, xylenes (BTEX)), heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), Polychlorinated Biphenyls (PCBs) and asbestos);
- Laboratory analysis on two (2) soil samples for Suspension Peroxide Oxidation Combined Acidity and Sulfur (sPOCAS) testing;
- Laboratory analysis of three (3) groundwater samples for a general suite of analytes (TRH, BTEX, PAHs, OCPs, OPPs, dissolved heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), and nutrients); and
- Preparation of this Preliminary Detailed Site Investigation Report (DESA).

Analysis of the results of soil samples submitted for laboratory testing identified the following exceedances of the Site Assessment Criteria (SAC):

- BH2-4.5-4.95 exceeded the SAC HSL- A & B value for Fraction 1 TPH (45 mg/kg) with a value of 120 mg/kg (and 86 mg/kg, laboratory replicate); and
- BH5-22.5-22.95 exceeded the SAC HSL A & B values for Fraction 1 TPH (45 mg/kg) with a value of 220 mg/kg.

All soil samples analysed for PAH, heavy metals, OCP's, OPP's, PCB's and asbestos indicated results of concentrations less than the SAC.

Acid Sulfate Soils (ASS) samples submitted for testing indicated that ASS were present in both locations as follows:

- BH01 at 1.5 mbgl, sulfur trail 0.36%, acid trail 120 mol H^+ /tonne; and
- BH02 at 3.25-3.45 mbgl, sulfur trail 0.35%, acid trail 190 mol H^+ /tonne.

Groundwater levels ranged between 1.68 metres below ground level (mbgl) and 1.72 mbgl, and indicated a flow direction towards the Cooks River to the north of the Site. Groundwater samples indicated concentrations of analytes to be less than the SAC, with the following exceptions:

- Nickel in sample collected from BH05 which exceeded the Groundwater Investigation Level (GIL) trigger value of 7 µg/L with a concentration of 13 µg/L;
- Total Nitrogen concentration ranged from 9.1 mg/L in BH01 to 18 mg/L in BH02, the values within the range exceeding the GIL trigger criteria of 0.30 mg/L;

- Oxides of Nitrogen concentrations ranged from less than the laboratory PQL of 0.005 mg/L in BH05 to 0.3 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.015 mg/L;
- Ammonia concentrations ranged from 5.2 mg/L in BH01 to 12 mg/L in BH02, the values within the range exceeding the GIL trigger value of 4.55 mg/L;
- Phosphate concentrations ranged from 0.062 mg/L in BH05 to 0.23 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.005 mg/L; and
- Phosphorus concentrations ranged from 0.4 mg/L in BH01 to 1.2 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.03 mg/L.

The site is considered suitable for the intended future use as mixed use (SP4 Enterprise and RE1 Public Recreation). In the event the construction activities will include dewatering of the site, further investigation of groundwater quality should be undertaken to determine the appropriate groundwater disposal method. Excavation works at the site should be managed in accordance with the *Acid Sulfate Soils Management Plan, Cooks Cove Development Zone, Arncliffe and Banksia, NSW* prepared by CES (Document Reference: CES130608-BP-AZ, dated 15 February 2023) in the event excavation is undertaken.

DETAILED ENVIRONMENTAL SITE ASSESSMENT
19 MARSH STREET, ARNCLIFFE, NSW
COOKS COVE DEVELOPMENT ZONE
PREPARED FOR COOK COVE INLET PTY LTD

CES Document Reference: CES130608-BP-AT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ASS	Acid Sulfate Soil
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
CES	Consulting Earth Scientists Pty Ltd
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
ESA	Environmental Site Assessment
GME	Groundwater Monitoring Event
km	Kilometre
LGA	Local Government Area
m	Metre
mbgl	metres Below Ground Level
NEPM	National Environment Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PSP	Project Safety Plan
SWSOOS	Southern and Western Suburbs Ocean Outfall System
TRH	Total Recoverable Hydrocarbons

DETAILED ENVIRONMENTAL SITE ASSESSMENT
19 MARSH STREET, ARNCLIFFE, NSW
COOKS COVE DEVELOPMENT ZONE
PREPARED FOR COOK COVE INLET PTY LTD

CES Document Reference: CES130608-BP-AT

1 INTRODUCTION

This report has been prepared by Consulting Earth Scientists Pty Ltd (CES), on behalf of Cook Cove Inlet Pty Ltd (the Client), to support the public exhibition and assessment of the Cooks Cove Planning Proposal (PP-2022-1748), which was issued a Gateway Determination by the Department of Planning and Environment on 5 August 2022. The proposal seeks to amend Bayside Local Environmental Plan 2021 (BLEP 2021) to rezone and insert planning controls for certain land known as Cooks Cove within the BLEP 2021.

The Cooks Cove Planning Proposal aims to facilitate the long-planned transformation of 36.2ha of underutilised and strategically important land at Arncliffe, located to the north of the M5 Motorway and adjacent the western foreshore of the Cooks River. The project seeks a renewed focus on delivering a contemporary logistics and warehousing precinct within a well-connected location, surrounded by enhanced open space provisions. The site forms part of the broader Bayside West 2036 Precincts and generally comprises the footprint of the former Kogarah Golf Club, now in part occupied by a temporary M6 Stage 1 construction compound.

The Environmental Site Assessment (ESA) and subsequent Remediation Action Plan are required to satisfy State Environmental Planning Policy (Resilience and Hazards) 2021 former State Environmental Planning Policy No 55—Remediation of Land (SEPP 55).

The Cooks Cove Master Plan , as prepared by Hassell, represents an optimised and refined reference scheme, to guide best practice design and the preparation of detailed planning controls to achieve an attractive precinct with high amenity. Key features of the Cooks Cove Master Plan are:

- A net development zone of approximately 15ha with up to 343,250m2 Gross Floor Area (GFA) comprising
    - 290,000m^2 of multi-level logistics and warehousing;
    - 20,000 m^2 for hotel and visitor accommodation uses;
    - 22,350 m^2 for commercial office uses;
    - 10,900 m^2 of retail uses;
- Multi-level logistics with building heights generally up to 5 storeys (approx. 48m)
- A retail podium with commercial office and hotel above, up to a total of 12 storeys (approx. 51m)

- Built form of a scale and composition which caters for the generation of approximately 3,300 new jobs
- A surrounding open space precinct including:
- A highly activated waterfront including the Fig Tree Grove outdoor dining and urban park precinct
- A significant extension of the regional Bay to Bay cycle link, 'Foreshore Walk', including active and passive recreational uses, together with environmental enhancements
- Master planned and Council-owned 'Pemulwuy Park' – with an agreed embellishment outcome of passive open space and environmental enhancements to be delivered in stages post construction of the M6 Stage 1 Motorway
- Complementary on and off-site infrastructure to be delivered by way of State and Local Voluntary Planning Agreements.

This report applies to a portion of the Cooks Cove Development Zone and provides an environmental site assessment of 19 Marsh Street, Arncliffe, New South Wales (NSW) legally described as Lot 31 in Deposited Plan (DP) 1231486 (formerly described as Lot 10 DP570900 and Lot 101 DP 1231954) (the site).

The site consists of approximately 4,400 m^2 (0.4 ha) and immediately bound by neighbouring Lots (Lot 103 of DP 1231954, Lot 13 of DP 570900, and Lot 14 of DP 213314) and Marsh Street to the south and west, the Cooks River immediately bordering the north-eastern boundary, and infrastructure and facilities of Rowers on Cooks River. The site was unoccupied and secured with fencing and electronic gating at the time of the investigation.

This report comprises a Detailed Environmental Site Assessment (DESA). A site location plan is presented on Figure 1.

This report has been prepared in general accordance with the CES proposal dated 28 July 2015 (CES document reference: CES130608-BP-AD v3). It has also been prepared in general accordance with the requirements specified for a Site Investigation as published by the NSW Environment Protection Authority (EPA) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (State of NSW and Office of Environment and Heritage (OEH)), 2011 and the National Environmental Protection Measure (NEPM) *Guideline on Site Characterisation* (Schedule B2) 1999, as amended 2013. This report should be read in conjunction with the Preliminary Environmental Site Assessment (PESA) (Desk Study) compiled by CES (CES Document Reference: CES130608-BP-AT, dated 5 May 2017).

It is noted that the *Contaminated Sites Sampling Design Guidelines* (NSW EPA, 1995) have been superseded by the new *Contaminated Land Guidelines Sampling Design Part 1 – Application* (NSW EPA 2022) and *Contaminated Land Guidelines Sampling Design Part 2 – Interpretation* (NSW EPA 2022).

It is also noted that the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (State of NSW and Office of Environment and Heritage (OEH)), 2011 have been superseded by the NSW EPA, *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

Based on a review of the new guidelines, overall, the investigation has been completed in general accordance with the updated guidelines and not impacted the assessment.

The findings of this report are based on an intrusive investigation of the underlying soil and groundwater.

The DESA undertaken at the site comprised an initial intrusive assessment of the underlying soils and groundwater to investigate the site suitability for the proposed Enterprise and Public Open Space development. Systematic sampling was undertaken to determine the existence and distribution of the COPC identified within the PESA (CES, 2017).

The results of this preliminary DESA indicate that the site has some localised Fraction 1 TRH impact, in addition to confirmed classification of AASS and groundwater quality that exceeds the nominated screening criteria. However, upon review of the current proposed site development plans, it is unlikely that the current soil conditions and groundwater quality underlying the site will adversely impact current and future site users and sensitive ecological receptors.

The site is therefore considered suitable for the intended future use SP4 Enterprise and RE1 Open Space. In the event the construction activities will include dewatering of the site, further investigation of groundwater quality should be undertaken to determine the appropriate groundwater disposal method. Excavation works at the site should be managed in accordance with the Acid Sulfate Soils Management Plan, Cooks Cove Development Zone, Arncliffe and Banksia, NSW prepared by CES (Document Reference: CES130608-BP-AZ, dated 15 February 2023), in the event excavation is undertaken.

2 OBJECTIVES AND SCOPE OF WORKS

The objective of the DESA is to investigate the COPC identified in the corresponding PESA (CES, 2017) and determine whether the site in its present state, without further investigation or remediation, is suitable for the proposed future use of the site.

To achieve the objective, CES has completed the following scope of works:

- Undertake drilling of five (5) boreholes to target depths ranging 5 m to 30 m, in addition to five (5) boreholes excavated by hand auger;
- PID screening of samples collected every 1 m to determine potential presence of volatiles;
- Sampling of fill materials and soil for laboratory analysis;
- Acid sulfate soil screening in three boreholes to a maximum depth of 2 m
- Installation of groundwater monitoring wells in three of the 5 drilled boreholes to a depth of 6 m to allow for determination to groundwater flow;
- One-off groundwater sampling event to chemically characterise the groundwater encountered at the site;
- Laboratory analysis of fifteen (15) soil samples for a general suite of analytes (Total Recoverable Hydrocarbons (TRH), monocyclic aromatic hydrocarbons (benzene, toluene, ethylbenzene, xylenes (BTEX)), heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), Polycyclic Aromatic Hydrocarbons (PAHs), Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), Polychlorinated Biphenyls (PCBs) and asbestos);
- Additional laboratory analysis on two (2) acid sulfate soil (ASS) screened samples for Suspension Peroxide Oxidation Combined Acidity and Sulfur (sPOCAS) testing;
- Laboratory analysis of three (3) groundwater samples for a general suite of analytes including TPH, BTEX, PAH's, OCPs and OPPs; and
- Preparation of this Preliminary Detailed Environmental Site Assessment report (DESA).

3 DATA QUALITY OBJECTIVES

Step 1 - State the Problem
The problem is that the limited investigations undertaken on the site to date do not provide sufficient information to adequately characterise soil and groundwater quality.

Step 2 - Identify the Decision Statement
The aim of this step is to identify what questions this program will attempt to resolve and to discuss what actions may result.

The primary question that this investigation will attempt to resolve is:

- What is the extent of soil and groundwater, if any, as a result of previous land uses on both this and adjacent sites?

It is expected that by resolving this question, it will be possible to develop more focussed remediation options for the site, if required.

Step 3 - Identify inputs to the decision
The following data are required to resolve the decision question(s):

- The key contaminants of concern as identified from the findings from previous environmental investigations;
- The installation of 10 boreholes across the site, with three boreholes converted to groundwater monitoring wells. In addition;
- Collection of soil samples at regular depth intervals in each borehole;
- Collection of groundwater samples from each of the groundwater monitoring wells following development and purging in accordance with appropriate methods;
- Standing water levels to be recorded in each monitoring well prior to sampling;
- Analysis of both soil and groundwater samples for the contaminants of concern and other analytes which will assist in characterising underlying soils and groundwater and developing remediation techniques, if required;
- Comparison of the results with relevant site assessment criteria (*ie*. NEPC (2013) *Investigation Levels for Soil and Groundwater*; ANZG (2018) *Australian and New Zealand guidelines for fresh and marine water quality* and Ahern et. al. (1998) *Acid Sulfate Soils Assessment Guidelines*; and
- Obtain survey data, including the position and relative heights, for each of the monitoring wells. When combined with the water level data and analytical results this

will enable a determination of the spatial and vertical extent of the contaminant plumes and direction of groundwater flow.

Step 4 - Define the boundaries of the study

The site has been referred to as 19 Marsh Street, within the Cooks Cove Development Zone. It is bound by Marsh Street to the north, Marsh Street to the west, the Cooks River to the east and Marsh Street to the south.

The legal description of the developable land is Lot 31 in Deposited Plan (DP) 1231486 (formerly described as Lot 10 DP570900 and Lot 101 DP 1231954). It is located within the Local Government Area (LGA) of Bayside , Parish of St George, County of Cumberland.

A site survey plan including the site and individual allotment boundaries, building locations and other relevant detail is provided as Figure 2.

It is anticipated that the vertical extent of the study will be the top approximately 25 m, with this depth considered sufficient to provide an assessment of natural soil as well as intercept the shallow groundwater zone.

Step 5 - Develop a decision rule

The purpose of this step is to define the parameters of interest, specify the action levels and combine the outputs of the previous DQO steps into an "if…then…" decision rule that defines the conditions that would cause the decision maker to choose alternative actions.

The parameters of interest (or contaminants of concern) in the soil for this investigation are metals and metalloids, TRH, BTEX, PAHs, OCPs, PCBs and asbestos. For the groundwater investigation, the contaminants of concern are metals and metalloids, nutrients, TPH, BTEX, PAHs, OCPs and OPPs.

The action level which will be used to decide if the parameter represents an unacceptable risk for the proposed Enterprise and Open Space land use are provided as Site Assessment Criteria (SAC) in Section 8 of this document.

The types of data quality required during the fieldwork component of the investigation and for the laboratory analyses are specified in Section 9. The acceptable limits for this data are defined in Table 7.

Based on these data quality types and limits the following decision rules will apply:

- Impacted soil will be identified by concentrations exceeding the assessment criteria;

- Impacted groundwater will be identified by concentrations exceeding the assessment criteria;
- If contaminants of concern are detected in the trip blanks, then potential cross contamination may have occurred during sample transport. To assess whether this is the case, CES will check the trip blank results with the laboratory and compare the results with other blanks provide by the same laboratory. It is possible that detections in trip blanks may reflect background concentrations in laboratory-supplied water or analytical error. If it is concluded that decontamination procedures were inadequate CES will assess the severity of the cross contamination and subsequent impacts on the ability to resolve the decision question. Possible actions may include the raising of working detection limits or the collection of replacement data;
- If RPDs for blind replicates or split samples are outside the acceptable limits, then there may be errors in laboratory analysis process. When assessing duplicate pairs with elevated RPDs, CES will check the results with the laboratory(ies) and examine the nature of the sample being assessed, since heterogeneous samples can often provide high RPDs. If it is believed that irreversible errors have occurred during the laboratory process then additional investigation will be required to resolve the decision question; and
- If any of the laboratory data quality tests do not meet the acceptable limits, the laboratory will be requested to retest samples or provide justification for the results.

Step 6 - Specify acceptable limits on decision errors

There are two types of errors:

a) Deciding that the site is acceptable for mixed (Enterprise and Public Recreation) land use when it actually is not (Type I error). The consequence of this error may be unacceptable ecological or health risk for future users of the site.

b) Deciding that the site is unacceptable for mixed (Enterprise and Public Recreation) land use when it is acceptable (Type II error). The consequence of this error is that the client will pay for further investigation / remediation that is not necessary.

The more severe consequence is with decision error (a) since the risk of jeopardising human health outweighs the consequences of paying more for remediation.

It will not be possible to conduct statistical hypothesis tests as the proposed sampling programme consists of the collection of one round of samples only. Unlike soils, it is not generally appropriate to compare guideline levels with Upper Confidence Limits (UCLs) for the mean of measured concentrations. The level of impact on groundwater will need to be assessed at each monitoring well.

Step 7 - Optimising the Design for Obtaining Data

The purpose of this step is to identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 7. To ensure the design satisfies the DQOs a comprehensive Quality Assurance and Quality Control plan will be implemented as described in Section 9.

4 SITE INFORMATION

The site information presented below is based on a review of government and publicly available information sources.

4.1 SITE IDENTIFICATION

The site is located at 19 Marsh Street, Arncliffe, NSW 2205, within the Local Government Area (LGA) of Bayside Council. The site covers an area of approximately 0.4 hectares, and is legally identified as a single lot, Lot 31 in Deposited Plan (DP) 1231486. A site location plan is presented on Figure 1. The geographical extent of the site is presented in Table 4.1 below.

Table 4.1: Geographical extent of site

Corner/point of site	Eastings	Northings
North corner of site	329916.822 mE	6243704.569 mN
East corner of site	329975.682 mE	6243651.684 mN
West corner of site	329867.42 mE	6243665.665 mN
Southwest corner of site	329843.809 mE	6243633.889 mN
Centre of site	329908.981 mE	6243664.682 mN

4.2 SITE ZONING

The site is currently zoned for Open Space, land use under the State Environmental Planning Policy (Precincts—Eastern Harbour City) 2021. It is proposed to rezone the site for Infrastructure, Public Recreation and Enterprise uses.

4.3 SITE DESCRIPTION

The site was unoccupied at the time of the investigation. The site comprised a demountable building for use as site offices and the East Australian Pipeline Limited Valve Station, occupying the south-eastern boundary of the site.

No visual or olfactory evidence of impacts were identified during the site inspection (e.g. surface staining or distressed vegetation) and no storage of chemicals or fuels were observed.

The north-eastern boundary of the site is defined by the banks of Cooks River, whilst the southern boundary is defined by neighbouring Lot 103 of DP 1231954 and Marsh Street. The northern boundary is defined by Levey Street and the infrastructure and facilities of Rowers Recreation Club and the western boundary of the site is bounded by Lot 13 of DP 570900 and Lot 14 of DP 213314.

The inspected condition of Marsh Street is good and the remaining site surface conditions within the fenced compound of the site were unsealed but well maintained.

4.4 PROPOSED DEVELOPMENT

The current proposed mixed-use development is illustrated in The Cooks Cove Master Plan , as prepared by Hassell. The Master Plan represents an optimised and refined reference scheme, to guide best practice design and the preparation of detailed planning controls to achieve an attractive precinct with high amenity. Key features of the Cooks Cove Master Plan are:

- A net development zone of approximately 15ha with up to 343,250m^2 Gross Floor Area (GFA) comprising
  - 290,000m^2 of multi-level logistics and warehousing;
  - 20,000m^2 for hotel and visitor accommodation uses;
  - 22,350m^2 for commercial office uses;
  - 10,900m^2 of retail uses;
- Multi-level logistics with building heights generally up to 5 storeys (approx. 48m)
- A retail podium with commercial office and hotel above, up to a total of 12 storeys (approx. 51m)
- Built form of a scale and composition which caters for the generation of approximately 3,300 new jobs
- A surrounding open space precinct including:
- A highly activated waterfront including the Fig Tree Grove outdoor dining and urban park precinct
- A significant extension of the regional Bay to Bay cycle link, 'Foreshore Walk', including active and passive recreational uses, together with environmental enhancements
- Master planned and Council-owned 'Pemulwuy Park' – with an agreed embellishment outcome of passive open space and environmental enhancements to be delivered in stages post construction of the M6 Stage 1 Motorway
- Complementary on and off-site infrastructure to be delivered by way of State and Local Voluntary Planning Agreements.

4.5 SURROUNDING LAND USE

Based on observations from the site inspection, the surrounding land use comprised the following:

- **North** – The site is immediately bordered by Levey Street and the infrastructure and facilities of Rowers Recreation Club;
- **East** – The site is immediately bordered by the Cooks River;
- **South** – The site is bordered by neighbouring Lot 103 of DP 1231954 and Marsh Street, with the Kogarah Golf Club present further south; and

- **West** – Immediately bordered by Lot 13 of DP 570900 and Lot 14 of DP 213314, and further west by Marsh Street and the Mercure Sydney International Airport Hotel; beyond which is detached residential properties.

4.6 TOPOGRAPHY

A review of the Botany Bay 1:25,000 Topographic map (Sheet No. 9130-3-S) indicated that the site elevation is less than 2 m Australian Height Datum (AHD). The site appears generally flat.

4.7 HYDROLOGY AND DRAINAGE

The nearest surface water features are Cooks River (flowing from west to east) located north and east of the site boundary. Based on contouring of the site, drainage is considered likely to be in an easterly direction towards Cooks River.

4.8 GEOLOGY

The Sydney 1:100,000 Geological Series Map indicates that the geology underlying the site comprises medium to coarse-grained quartz sandstone, very minor shale and laminate lenses of the Wianamatta Group. This lithology is most likely to be of braided alluvial channel fill origin. The deposit has been reworked significantly in the last century as part of river diversion works, of which has involved significant dredging operations.

4.9 SOILS

A review of the Sydney 1:100,000 Soil Landscape Series Map (Sheet 9130: Soil Conservation Service of NSW, 1983) indicates that the site is underlain by a combination of Disturbed Terrain and Birrong Soil Landscape Group. The Birrong Soil Landscape Group is characterised by *"level to gently undulating alluvial floodplain draining Wianamatta Group shales. Local relief to 5m, slopes <3%. Broad valley flats. Extensively cleared tall open-forest and woodland".*

4.10 ACID SULFATE SOILS

In accordance with the ASS Soil Classification, the area of Cooks River has been identified as Soil Class 1 and has been described as area of the highest environmental risk. ASS in a Class 1 area are likely to be found on and/or immediately below the natural ground surface and any works will trigger the requirement for assessment and may require management. The majority of the site has been unmapped, with the exception of a small portion within the western corner of the site classified as Class 3. Class 3 ASS soil classification is defined as soils that are likely to be found beyond 1 metre below the natural ground surface. Development consent is required in this area for works more than 1 metre below the natural ground surface and works by which the watertable is likely to be lowered more than 1 metre below the natural ground surface.

4.11 HYDROGEOLOGY

The aquifers on site is described as a porous, extensive highly productive aquifers. It is expected that groundwater would flow towards Cooks River to the northeast.

Within the vicinity of the site, Cooks River is tidal and diurnal fluctuations in groundwater levels in the peripheral areas of the site are expected to occur in response to tidal cycles.

A total of 10 registered groundwater wells are located within 500 metres of the site. The majority (6) are registered for private 'Domestic Use' whilst the others are registered for 'General Use', 'Domestic, stock', 'Irrigation' and 'Recreation'. General and domestic wells refer to use by private persons for non-potable use. None of the registered wells are located on the site. Two registered groundwater wells have reported well yields range of 7.7 and 0.79 L s^{-1} and depth to groundwater noted as 14 metres below ground level in one of the two wells. The salinity of the two recorded wells installed are reported as 1600 and 8000 mg/L. These data indicate that the study area is surrounded and underlain by relatively permeable strata.

4.12 SENSITIVE LOCAL ENVIRONMENTS

There are no records or observations of underground storage tanks located at the site. The site is located within an Underground Petroleum Storage System (UPSS) sensitive local environment in the Local Government Area (LGA) of Rockdale as determined by NSW EPA.

Additionally, there were no records of any storage of dangerous goods within the site. This also means the SafeWork NSW do not have any records of above and below ground (fuel) tanks.

5 SITE HISTORY

Information pertaining to the history of the site was obtained through a review of information available from external sources including historical title searches, aerial photographs, SafeWork NSW Dangerous Goods files and council records.

5.1 PROPERTY TITLE INFORMATION

A title deeds search was conducted by Lotsearch for the site for the Preliminary Site Assessment (CES document reference: CES130608-BP-AT, dated 5 May 2017). A summary of the property title information indicates that the site has predominantly been owned and utilised as a recreational golf facility since 1922. Kogarah Golf Club has taken ownership of the site since 1972 to the present day.

There is no evidence of historic contaminating activities being undertaken within the vicinity of the study site. However, a review of the historical aerial photographs suggests that the site may have been resurfaced using materials sourced from the materials dredged from the Cooks River.

5.2 HISTORICAL AERIAL PHOTOGRAPH INTERPRETATION

A review of historical aerial photographs taken between 1943 and 2014 indicates that the site was initially vacant land. Development is apparent around 1970 with the construction of a dam feature (which has since been filled) and construction of several small buildings. The footprint of the site was developed with concrete hardstand between 2001 and 2009. The review also suggests that the site was used as a car parking lot between the dates of 2009 and 2014. The review suggests there being no significant on-site sources of contamination.

A review of the historical photographs produced on Nearmap (accessed 3 February2023) was undertaken. The review indicated no significant change to the site or its surrounds between the dates of 14 November 2009 and November 2022, with the exception of the construction of the Westconnex M8 and M6 Stage 1 Motorway Temporary Compound during August 2016 to date.

Various potentially contaminating land uses have been identified in the immediate vicinity of the site, which include the Alexandria Foundry and Steggles Poultry Processing Plant, previously situated in the current location of the Mercure Sydney International Airport Hotel.

5.3 SEWER AND SERVICE PLANS

A review of Dial-Before-You-Dig (DBYD) plans indicates numerous significant underground services transect the site. Targeted location of underground services in the proposed investigation areas identified:

- The presence of the Gorodok Ethane Pipeline, running through the centre of the site before running east parallel to Marsh Street;
- Electricity cables along the southern boundary of the site;

- Telstra services are also on site within the south-western portion of the site;
- Optus fibre optic cables running the length of the southern boundary;
- A Sydney Water cast iron sewer main is mapped in the DBYD plans as transecting the western corner of the site; and
- A steel cement lined potable water main (desalination pipeline) which is approximately 1800 mm in diameter and runs through the centre of the site from the south and turning northeast towards Cooks River.

6 PRELIMINARY CONCEPTUAL SITE MODEL

A Preliminary Conceptual Site Model (CSM) has been developed to provide an understanding of the contamination status of the site. Its purpose is to develop a hypothesis on the contamination of the site which can be tested through a programme of soil and groundwater testing.

The Preliminary CSM has been developed in consideration of the historical information and current site conditions. It considers historic site uses and the proposed future redevelopment scheme.

6.1 POTENTIAL SOURCES OF CONTAMINATION

The following potential contamination sources are relevant to the site:

6.1.1 Uncontrolled Fill

As part of the infilling of the dam feature, uncontrolled fill is likely to be present. The origin of the fill is unknown and the potential exists for this material to be contaminated. Contaminants of Potential Concern (COPC) typically encountered in uncontrolled fill include:

- Total Recoverable Hydrocarbons (TRH);
- Monocyclic Aromatic Hydrocarbons (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc);
- Organochlorine Pesticides (OCPs); and
- Asbestos.

6.1.2 Car Parking

The potential for parked cars to cause significant contamination is low, since the volumes of fuel are relatively low and the surface is covered with hardstanding; however, there remains the potential for isolated and localised pockets of TRH, BTEX and PAH impact.

6.1.3 Off-site Contamination Sources

Due to the historical use of the Mercure Sydney International Airport Hotel location as the Alexandria Foundry and Steggles Poultry Processing Plant, it is possible that contaminants may have migrated (along preferential pathways – such as buried services or in groundwater) from these historical sources, however this is considered low risk.

6.2 POTENTIAL PATHWAYS

The pathways through which contaminants may reach receptors are in part dependent on the nature and behaviour of the contaminant and the specific nature, use and layout of the future development. The following potential pathways have been identified:

- Soil ingestion and dermal contact with impacted fill / soils;
- Inhalation of contaminants in the particulate form (dust);
- Volatilisation and migration of volatile organic contaminants from soil and / or perched groundwater to indoor (following future building construction) or outdoor air and inhalation;
- Leaching of contaminants from site fill / soils into groundwater; and
- Lateral migration of contaminants in groundwater (dissolved and immiscible phases) to surface waters (Cooks River).

Preferential flow pathways may be provided by:

- More permeable layers within the fill and / or natural strata; and
- Underground services e.g. water pipes and drainage networks that transect the site.

6.3 RECEPTORS

Potential sensitive receptors (on and off-site) are listed below:

- Future workers during the construction of the proposed redevelopment;
- Future users / visitors of the proposed redevelopment;
- Groundwater beneath the site;
- Nearby surface waters (Cooks River); and
- Neighbouring residents / site users.

7 SAMPLING AND ANALYTICAL PROGRAMME

The following sampling programme has been carried out, to identify potential contamination issues resulting from past activities undertaken at the site and takes into consideration the objectives of the environmental investigation. The sampling and analysis programme is designed to assess the contamination status of fill and natural soils, and groundwater.

7.1 SAMPLING PATTERN

To determine the degree of potential contamination across the site, CES carried out a systematic sampling pattern within the constraints of the site. However, final borehole locations were influenced by the underground services underlying the site and as such may not have reflected regular and even intervals.

The location of the boreholes is presented in Figure 2.

7.2 GROUNDWATER MONITORING WELL INSTALLATION

Three groundwater monitoring wells were installed in boreholes BH01, BH02 and BH05. BH01 and BH02 were installed to depths of 5 metres below ground level (mbgl) (screened 4 m), and BH05 was installed to depth of 6 mbgl (screened 5 m). All installations were completed with a gravel pack from the depth of the well to 0.5 mbgl and finalised with bentonite and gatic covers.

7.3 SAMPLING DENSITY

A total of ten assessment locations were identified for the DESA. In accordance with Table A of the Sampling Design Guidelines (NSW EPA, 1995) to identify a soil contamination hotspot with a diameter of between 22.5 and 23.1 m with 95% confidence on a site area between 0.4 and 0.5 ha, the minimum sample points required would range between 11 and 13 locations. This investigation is considered to be a DESA for the following reasons:

- The number of services underlying the site restrict the density and sampling pattern; and
- Lack of areas of environmental concern identified during the Preliminary Site Investigation due to the previous site use.

It is noted that the *Contaminated Sites Sampling Design Guidelines* (NSW EPA, 1995) have been superseded by the new *Contaminated Land Guidelines Sampling Design Part 1 – Application* (NSW EPA 2022) and *Contaminated Land Guidelines Sampling Design Part 2 – Interpretation* (NSW EPA 2022). The sample density was less than the minimum sampling points for site characterisation recommended in the NSW EPA (2020), however, is still considered appropriate considering:

- land is being redeveloped for a less sensitive land use,
- a review of the sampling locations (Figure 2) indicated a comprehensive site coverage
- the guidelines allow for judgemental/targeted sampling based on knowledge of the probable distribution of contaminants at the site, with known or suspected areas of contamination being specifically targeted based on the CSM.

7.4 DEPTH INTERVALS OF SAMPLING

Soil samples were collected from the fill and natural soils. Details on sample locations and depths are presented in Table 1.

7.5 METHOD OF SAMPLING COLLECTION

Care was taken to ensure that representative samples are obtained from the depth required and that the integrity is maintained during the intrusive investigation. All soil samples were collected directly from the auger and standard penetration test (SPT) split core barrel using new nitrile gloves. Care was taken when collecting samples to ensure the most representative sample of the targeted material was sampled.

7.6 DECONTAMINATION PROCEDURES

Drilling equipment was washed down between sampling lcoations. Soil samples were transferred directly from auger and SPT core barrels to laboratory prepared sample jars. Groundwater samples were collected using a bladder pump. Dedicated bladders and tubing were used at each sample location.

7.6.1 Sample Containers

The soil samples were collected in laboratory prepared glass jars with Teflon lined lids. The jars were completely filled with soil, sealed, labelled with the job number, date, unique sampling point identification and depth. Details of sample containers, preservation requirements and holding times for soil and groundwater samples are presented as Table 3a and 3b respectively.

Groundwater samples were collected in laboratory supplied containers. The containers were supplied by the laboratory with the appropriate sample preservatives for the proposed analysis.

7.7 METHOD OF SAMPLE STORAGE AND HANDLING

The sample containers were immediately placed in a cool box in which ice had been added to keep the samples cool. Samples were then transported directly to the laboratory.

7.8 DOCUMENTATION

While on site, the supervising engineer/scientist filled out a copy of CES "Daily Field Data Sheet", which documents:

- Time of sample collection;
- Weather;
- Unique sample identification number; and
- Sample location and depth.

All samples were classified in the field based on soil/fill characteristics and obvious signs of contamination such as discolouration or odour were noted on a log.

All samples, including QA samples, were transported to the primary and check laboratories under Chain-of Custody (COC) procedures and maintained in an ice-filled cooler. The COC details the following information:

- Site identification;
- The sampler's name;
- Nature of the sample;
- Collection time and date;
- Analyses to be performed;
- Sample preservation method;
- Departure time from site; and
- Dispatch courier(s)

During excavation, a borehole log was completed by a qualified geotechnical engineer / environmental scientist. The log recorded the following data:

- Sample number and depth;
- Soil classification, colour, consistency or density, and moisture content;
- Unusual characteristics such as odour and staining;
- Photoionization Detector (PID) screening results;
- Depth of excavation;
- Push tube rig refusal;
- Groundwater well installation details (where relevant);
- Method of excavation; and
- The depth of first encountered free water.

Borehole logs are presented as Appendix B.

7.9 ANALYTICAL PROGRAMME

7.9.1 Number of Samples for Analysis

7.9.1.1 Soil

A total of fifteen (15) environmental soil samples for were scheduled for analysis for a common suite of contaminants, and two (2) environmental soil samples scheduled for sPOCAS testing. The analytical programme is summarised below:

- Fifteen (15) soil samples for a suite of common contaminants including TRH, BTEX, Heavy Metals (Ar, Cd, Cr, Cu, Pb, Hg, Ni, and Zn), PAH, OCPs, OPPs, PCBs and Asbestos;
- Two (2) soil samples submitted for sPOCAS testing
- Quality control one blind replicate and one split replicate samples analysed for TRH, BTEX, heavy metals (Ar, Cd, Cr, Cu, Pb, Hg, Ni, and Zn), PAH, OCPs, OPPs, PCBs and asbestos; and
- Quality control Trip Blank analysed for TRH.

7.9.1.2 Groundwater

A total of three (3) environmental groundwater samples were scheduled for analysis. The analytical programme is summarised below:

- Three (3) groundwater samples for nutrients, TRH, BTEX, PAHs, OCPs, OPPs and dissolved heavy metals (Ar, Cd, Cr, Cu, Pb, Hg, Ni, and Zn); and
- Quality control one blind replicate and one split replicate samples analysed for nutrients, TRH, BTEX, PAHs, OCPs, OPPs and dissolved heavy metals.

7.9.2 Laboratory

CES used Envirolab Services Pty Ltd (Envirolab) as the primary lab and Australian Laboratory Services Pty Ltd (ALS) as the secondary or 'check' laboratory for all chemical testing. Both laboratories are NATA registered for the chemical testing.

7.9.2.1 Analytical Methods

The soil/fill was analysed in accordance with NEPC 1999 (2013) *Guideline on Laboratory Analysis of Potentially Contaminated Soils* using US EPA and APHA approved analytical methods and will provide analytical results consistent with the amended NEPM. That is to say the results for TRH will be presented as the four fraction bands (F1-F4) and speciated PAHs, including Benzo(a)pyrene toxicity equivalent quotient (TEQ). Asbestos was analysed in accordance with Australian Standard 4964-2004.

A list of soil and groundwater analytical parameters, laboratory Practical Quantitation Limits (PQLs) and laboratory methods are presented as Table 4 and Table 5 respectively.

8 SITE ASSESSMENT CRITERIA

The selection of the most appropriate investigation levels for use with a site specific environmental setting and land use scenario is required to consider factors including the protection of human health and ecosystems.

Investigation and screening levels are provided in *Guideline on Investigation Levels for Soil and Groundwater* (Schedule B1, NEPC, 2013) for commonly encountered contaminants which are applicable to generic land use scenarios and include consideration of, where possible, the soil type and the depth of contamination. Investigation levels and screening levels are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required. Investigation and screening levels provide the basis of Tier 1 risk assessment.

8.1 INVESTIGATION AND SCREENING LEVELS

Health investigation levels (HILs) have been developed for a broad range of metals and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally up to a depth of 3 m below the surface.

Health screening levels (HSLs) have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land use scenarios, and the characteristics of building structures. They apply to different soil types, land uses, and depths below surface to >4 m.

Ecological investigation levels (EILs) have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2 m of soil.

Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon (TPH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

Groundwater investigation levels (GILs) has been developed to assess human health risk and ecological risk from direct contact (including consumption) with groundwater. The investigation levels encompass the ANZECC (2000) *Australian and New Zealand Guidelines*

for Fresh and Marine Water Quality, NHMRC (2011) *Australian Drinking Water Guidelines*, and the NHMRC (2008) *Guidelines for Managing Risks in Recreational Waters*, and site specific derived criteria.

It is noted that ANZECC (2000) *Australian Water Quality Guidelines and NHMRC* (2011) *Australian Drinking Water Guidelines*, have been superseded by the Water Quality Guidelines, ANZG 2018, *Australian Drinking Water Guidelines 6*, 2011 Version 3.8 Updated September 2022, respectively.

A review of current Default Guideline Values (GDVs) reported in the *Water Quality Guidelines* (ANZG 2018) indicated that there were no changes to those values with the following exceptions:

- zinc (changed from 15 µg/L to 8 µg/L),
- nitrate (which was erroneous and in the absence of an ANZG (2018) default guideline value, refer to the "Grading" guideline values published in the report Updating nitrate toxicity effects on freshwater aquatic species, which were used to inform the current New Zealand nitrate toxicity attribute. Changed from 10,000 µg/L to 2,400 µg/L, which is the grading value reported in the guidelines for 95% protection)
- TRH (C6-C36) (not reported in the guideline)
- Ethylbenzene (changed from 5 µg/L to 80 µg/L)
- Total Xylenes (not reported in the guideline).

Acid sulfate Soil Action Criteria have been developed to determine the requirement for an ASS management plan. The Action criteria are based on the percentage of oxidisable sulfur (or equivalent TPA, TAA) for three broad categories of soil texture types, and the volume of material proposed to be disturbed. For projects that disturb more than 1,000 tonnes of soil with ≥0.03% oxidisable sulfur or equivalent existing acidity, a detailed management plan and development consent will be required (Ahern *et al.,* 1998).

8.1.1 Soil

8.1.1.1 Human Health Assessment

To address potential health impacts at the site, CES compared the analytical testing results against a set of health based soil investigation criteria appropriate for the proposed land-use. That is, the HIL has been set at a level that provides confidence that contaminant concentrations below the HIL will not adversely affect human health. As described in Section 4.4, the future site land-use is Enterprise and Open Space; as such, the NEPM (2013) HIL C (Recreational/Open Space) and HIL D (Commercial/Industrial) and NEPM (2013) HSL

(Recreational/ Open Space) and HSL D (commercial/industrial) criteria has been adopted for the assessment of human health.

8.1.1.2 Ecological Assessment

NEPC (2013) indicates that while protection of human health often drives the first stages of assessment, ecological assessment will need consideration for all sites. The closest waterbody, Cooks River, is immediately bordering the site and may be considered a sensitive ecological receptor.

To address the potential ecological impacts at the site, CES compared the analytical testing results against a set of ecological investigation and screening levels appropriate for the proposed mixed land use. The NEPM (2013) EIL criteria adopted were generated using the CSIRO for *NEPM Ecological Investigation Level Calculation Spreadshee*t (CSIRO, 2010). Conservative values for pH (7.0 pH), cation exchange capacity (CEC) (20 cmolc/kg), organic content (1%) and clay content (>10%) were used in the absence of available data. Additionally, the NEPM (2013) ESL (coarse soil texture) was adopted for the ecological assessment.

8.1.1.3 Acid Sulfate Soils

Trigger Action Criteria are adopted from Table 4.4 of the Acid Sulfate Soils Advisory Committee (ASSMAC) *Acid Sulfate Soils Assessment Guidelines* (Ahern *et al.,* 1998). A conservative approach of determining action criteria was adopted by assuming more than 1,000 tonnes of soil is proposed to be disturbed across the site area. As such an action criteria value for the sulfur trail of 0.03% S and 18 mol H^+ /tonne for the acid trail has been adopted for all soil texture types encountered.

8.1.1.4 Asbestos

Health screening levels for asbestos in soils, which are based on scenario-specific likely exposure levels, are adopted from the Western Australia, Department of Health (WA DoH) guidelines as outlined in Table 7 of Schedule B1, NEPC, 2013. Based on the proposed mixed use development, the Recreational C exposure setting has been selected. As such, the HSL for bonded asbestos containing materials (ACM) is 0.02% w/w and 0.001% w/w for asbestos fines and fibrous asbestos.

8.1.2 Groundwater

To address the data gap of groundwater characterisation at the site, CES compared results of samples of groundwater to the NEPM (2013) HSL C & HSL D (Commercial/Industrialfor sand) and NEPM (2013) GIL criteria for Marine Waters which encompasses the Water Quality Guidelines, (ANZG 2018), the *NHMRC (2011) Australian Drinking Water Guidelines* and the NHMRC (2008) *Guidelines for Managing Risks in Recreational Waters*.

Trigger values for marine water were adopted for this investigation rather than fresh water guidelines on the basis that the ultimate receiving system for the groundwater at the site is the estuarine section of the Cooks River. Groundwater assessment criteria for relevant parameters are summarised in Table 6.

As indicated earlier, it is noted that ANZECC (2000) Australian Water Quality Guidelines and NHMRC (2011) Australian Drinking Water Guidelines, have been superseded by the Water Quality Guidelines, ANZG 2018, Australian Drinking Water Guidelines 6, 2011 Version 3.8 Updated September 2022, respectively. Refer to Section 8.1 for comments.

9 QAQC DATA EVALUATION

Field and laboratory QA/QC requirements compliant with National Environmental Protection Council (1999 updated 2013) requirements are outlined below. Laboratory certificates of analysis are attached as Appendix C.

9.1 DATA ACCEPTANCE CRITERIA

The QA/QC Data was assessed against the Data Acceptance Criteria (DAC) provided in Table **7**.

9.1.1 Field QA/QC Programme

Soil samples were collected by an experienced Geotechnical Engineer and an experienced Environmental Scientist, under established CES protocols. CES personnel have been trained in sample collection and handling techniques.

For the purpose of assessing the quality of data presented in this report, CES collected and analysed Quality Control (QC) samples, while the laboratory completed their own QC. Tabulated QC data for soil and groundwater are provided in Table 8a and Table 8b respectively. The current section of this report is focused on the presentation of results of these QC samples and discussion of deviations from the Data Acceptance Criteria (DAC) (Table 7).

9.1.1.1 Blind Replicate Samples

As a minimum, the results of analyses on the blind replicate sample pair are assessed by calculating the Relative Percentage Differences (RPDs) between the results. The RPD is calculated as the difference between the results divided by their mean value and expressed as a percentage.

Soil

One blind replicate soil sample was collected from BH05 (Blind Replicate). The replicate sample was preserved, stored, transported, prepared and analysed in an identical manner to the primary environmental sample.

The RPD were all within the DAC listed in Table 7.

In summary, it is considered that the blind replicate sample confirms that the primary laboratory (Envirolab) analyses of the soil and groundwater samples are repeatable and accurate.

Groundwater

One blind replicate groundwater sample was collected from BH02 (QAQC 1). The replicate sample was preserved, stored, transported, prepared and analysed in an identical manner to the primary sample. As a minimum, the results of analyses on the blind replicate sample pair are assessed by calculating the Relative Percentage Differences (RPDs) between the results. The RPD is calculated as the difference between the results divided by their mean value and expressed as a percentage.

The RPDs were all within the DAC listed in Table 7, therefore it is considered that the blind replicate samples confirm that the primary laboratory (Envirolab) analyses of the soil and groundwater samples are repeatable and accurate.

9.1.1.2 Split Duplicate Samples

Split samples, otherwise known as 'inter-laboratory duplicates', provide a check on the analytical proficiency of the laboratories. Split samples are taken from the same location as the blind replicate, thus becoming a triplicate sample.

Soil

One split sample was collected from BH05 (Split Replicate), with the replicate sample preserved, stored, transported, prepared and analysed in an identical manner to the primary environmental sample.
The RPD were all within the DAC listed in Table 7. The results of the split sample analysis confirms the reliability of the laboratory analysis from Envirolab, since the all the RPD were compliant with the DAC. The results of the RPD analysis indicates the analytical proficiency of the laboratories.

Groundwater

One split sample was collected from BH05 (QAQC 2), with the replicate sample preserved, stored, transported, prepared and analysed in an identical manner to the primary environmental sample.

The RPD were all within the DAC listed in Table 7, therefore it is considered that the blind replicate samples confirm that the primary laboratory (Envirolab) analyses of the soil and groundwater samples are repeatable and accurate.

9.1.1.3 Laboratory Prepared Trip Blank

One trip blank was included in the sampling event. The trip blank conforms to the DAC listed in Table 7.

9.1.2 Laboratory QA/QC Programme

The reliability of test results from the analytical laboratories will be monitored according to the QA/QC procedures used by the NATA accredited laboratory. The QA/QC programme employed by Envirolab Services (Envirolab) (the primary laboratory) will specify holding times, extraction dates, method descriptions, Chain of Custody (COC) requirements, analysis, EQLs and acceptance criteria for the results. Laboratory QA/QC requirements undertaken by Australian Laboratory Services (ALS) are based on NEPM requirements and are outlined below (NEPC, 1999).

9.1.2.1 Laboratory Duplicate Samples

Laboratory duplicates provide data on analytical precision for each batch of samples. Where required and in order to provide sufficient sample for analysis of laboratory duplicates, two batches of samples are collected at the first site listed on the Chain of Custody form. This is done in order to ensure that sufficient sample is collected.

All laboratory duplicate samples' RPDs conformed to the DAC.

9.1.2.2 Laboratory Control Samples

Laboratory control samples consist of a clean matrix (de-ionised water or clean sand) spiked with a known concentration of the analyte being measured. These samples monitor method recovery in clean samples and can also be used to evaluate matrix interference by comparison with matrix spikes. Laboratory control samples may be certified reference materials.

All laboratory control samples conformed to the laboratory assessment criteria and therefore the DAC, with the exception of an exceedance of holding time for Nitrite in ALS laboratory report ES1806787.

9.1.2.3 Surrogates

A surrogate is added at the extraction stage of sample analysis in order to verify method effectiveness. The surrogate is then analysed with the batch of samples. Percent recovery is calculated.

All laboratory surrogate samples conformed to the laboratory assessment criteria and therefore the DAC.

9.1.2.4 Matrix Spike

A matrix spikes consist of samples spiked with a known concentration of the analyte measured, in order to identify properties of the matrix that may hinder method effectiveness.

Samples are spiked with concentrations equivalent to 5 to 10 times the PQL. Percent recovery is calculated.

All matrix spikes conformed to the laboratory assessment criteria and therefore to the DAC, with the exception of Total Kjeldahl Nitrogen in ALS laboratory report ES1806787, due to the background level being greater than four times the spike level.

9.1.2.5 Method Blanks

Method blanks are carried through all stages of sample preparation and analysis. Analyte concentrations in blanks should be less than the stated PQL. Reagent blanks are run if the method blank exceeds the EQL. The purpose of method blanks is to detect laboratory contamination.

All method blanks conformed to the laboratory assessment criteria and therefore to the DAC.

9.2 QAQC ASSESSMENT SUMMARY

CES has a high degree of confidence in the quality of the field data (that is to say that the soil samples were representative of the material sampled, the samples were collected by an experienced sampler and that the chain of custody documentation was accurate) and the laboratory data (that is to say that Envirolab and ALS are NATA accredited laboratories, and undertake strict internal QA/QC of the results issued, uses appropriate methodology and practical quantification limits (PQL) to analyse soil samples and has completed sample documentation).

In consideration of the QAQC assessment, it is the opinion of CES that the data collected is suitable for the assessment of the site.

10 INVESTIGATION RESULTS

10.1 SOIL

10.1.1 Fieldwork

Fieldwork was carried out on 22, 23, 24 and 25 January 2018. An underground services search was carried out and each borehole location was cleared for underground services prior to commencement of fieldwork.

Five boreholes mechanically drilled were advanced the first 2 mbgl using non-destructive drilling (NDD) techniques, before further advancement through fill to natural soils using SPT and wash bore drilling methods to a maximum depth of between 5 m and 30 m, or until refusal. The remaining five proposed boreholes, HA1 to HA5 inclusive, were advanced where possible using hand augers. Four locations of the proposed five sampling locations were unable to be advanced to the target depth due to unfavourable ground conditions. Where able to be retrieved, soil samples were collected every 1 m and screened for volatiles using a PID. Fill was encountered to a maximum depth of approximately 3 mbgl in borehole BH05.

A summary of borehole locations, termination depth, and sample depth is presented as Table 1. PID screening results are displayed in Table 11 and borehole logs are presented as Appendix B.

10.1.1.1 Acid Sulfate soil screening

Samples collected every 0.5 m to a target depth of 3 mbgl from boreholes BH01, BH02, BH03, and BH04 were screened for the presence of AASS and PASS.

The results of the ASS screening are displayed in Appendix D. The results of the screening indicate that the following samples suggest PASS:

- BH01-1.5;
- BH02-1.5; and
- BH02-3.25.

10.1.2 Laboratory Analytical Results

Soil analytical results are presented as Table 9. The laboratory Certificates of Analysis are presented in Appendix C.

10.1.2.1 TRH and BTEX

10.1.2.2 TRH and BTEX results for fill and soil samples were detected below the Site Assessment Criteria (SAC). PAHs

PAH results in fill and natural samples scheduled for analysis were below the SAC.

10.1.2.3 Heavy Metals

Heavy metal concentrations in fill and natural samples were below the SAC.

10.1.2.4 OCPs

OCP results in fill samples were below laboratory SAC and therefore the PQL.

10.1.2.5 OPPs

OPP results in fill samples were below laboratory SAC and therefore the PQL.

10.1.2.6 PCBs

PCB results in fill samples were below laboratory SAC and therefore the PQL.

10.1.2.7 Asbestos

No asbestos was detected in the fill samples analysed. In addition, no potential asbestos containing materials were observed within the site soils during the investigation.

10.1.2.8 Acid Sulfate Soil

Samples of fill and natural soil were collected for Acid Sulfate Soil (ASS) determinations. Two samples were submitted for sPOCAS testing as identified by the ASS field screening as PASS. The samples submitted for testing indicated that Acid Sulfate Soils were present in both locations as follows:

- BH01 at 1.5 mbgl, sulfur trail 0.36%, acid trail 120 mol H^+ /tonne; and
- BH02 at 3.25-3.45 mbgl, sulfur trail 0.35%, acid trail 190 mol H^+ /tonne.

10.2 GROUNDWATER

10.2.1 Fieldwork

One borehole drilled for the purposes of the preliminary geotechnical investigation, and two boreholes drilled for the purposes of the preliminary environmental investigation were converted to groundwater monitoring wells. Water samples were collected from all wells and tested for a range of analytes listed in Section 7.9.1.2.

10.2.1.1 Groundwater Quality Field Parameters

During purging of the groundwater wells, groundwater quality field parameters were measured using a multi-parameter water quality meter which measured temperature, pH, conductivity (EC), salinity, dissolved oxygen (DO) and oxidation-reduction potential (ORP). This equipment was calibrated by the equipment supplier prior to use on-site and did not require adjusting for redox measurements. Groundwater gauging data is presented in Table 2 and field data sheets and calibration certificates for the water quality meter is presented in Appendix E. Groundwater quality field parameters are presented in Table 10.2.1.1.

Table 10.2.1.1: Stabilised Field Measured Groundwater Parameters

Well ID	Temperature (Degrees Celsius)	Electrical Conductivity (uS/cm)	pH	Dissolved Oxygen (mg/L)	Redox (mV)	Observations at time of sampling
BH01	24.5	7,220	6.72	0.09	-99	Dark grey, turbid, organic odour
BH02	25.5	21,030	6.89	0.15	-125	Pale brown, turbid, organic odour
BH05	23.6	2,960	6.78	0.40	-130	Grey, turbid, organic odour

Due to the turbid nature of the groundwater caused by surrounding silty materials, low-flow micropurge sampling techniques could not be utilised in sampling locations BH01 and BH02, therefore grab sample methods were used at the time of sample collection.

10.2.1.1.1 Groundwater Levels

Standing groundwater levels were measured in monitoring wells BH01, BH02 and BH05 following development. A summary of the groundwater readings is given in Table 10.2.1.1.1.

Table 10.2.1.1.1: Summary of Groundwater Levels

Borehole ID / Well ID	Groundwater Depth	
	m (below the ground level)	m AHD
BH01	1.33*	0.33*
BH02	1.72	0.16
BH05	1.68	0.11

*measurement considered anomalous.

Groundwater levels were expected to decline in the direction of the Cooks River, suggesting flow in that direction. That is to say, groundwater depth measured below ground level increasing from BH05 to BH01 and BH02. The groundwater level measured in BH01 is likely

an anomaly due to the silting of the well during the period of installation and monitoring. Natural groundwater level at this location is expected to be similar to that of borehole BH02.

10.2.2 Laboratory Analytical Results

Groundwater analytical results are presented as Table 10. The laboratory Certificates of Analysis are presented in Appendix C.

10.2.2.1 TRH and BTEX

TRH and BTEX results for groundwater samples were all below the SAC and therefore the laboratory PQL with the exception of the following concentrations:

- TRH C10-C14, TRH>C10-C16, and Fraction 2 (TRH>C10-C16 minus Naphthalene) in the sample collected from BH05 which had a concentrations of 74 µg/L, 53 µg/L, and 53 µg/L respectively.
- Ethylbenzene in the sample collected from BH05 which had a concentration of 2 µg/L;
- m+p xylene in the sample collected from BH05 which had a concentration of 3 µg/L;

O-xylene in the sample collected from BH05 which had a concentration of 1 µg/L

10.2.2.2 PAH

PAH results in groundwater samples were below the SAC and therefore below laboratory PQL.

10.2.2.3 Heavy Metals

Dissolved heavy metal concentrations in groundwater samples were below the SAC, with the exception of Nickel with a concentration of 13 µg/L measured in sample BH05 which exceeded the Groundwater Investigation Level (GIL) trigger value of 7 µg/L.

10.2.2.4 OCPs

OCP results in groundwater samples were below the SAC and therefore below laboratory PQL..

10.2.2.5 OPPs

OPP results in groundwater samples were below the SAC and therefore below laboratory PQL..

10.2.2.6 Nutrients

Nutrient concentrations in groundwater samples exceeded the GIL trigger values adopted from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000), and were as follows:

- Total Nitrogen concentration ranged from 9.1 mg/L in BH01 to 18 mg/L in BH02, the values within the range exceeding the GIL trigger criteria of 0.30 mg/L;
- Oxides of Nitrogen concentrations ranged from less than the PQL of 0.005 mg/L in BH05 to 0.3 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.015 mg/L;
- Ammonia concentrations ranged from 5.2 mg/L in BH01 to 12 mg/L in BH02, the values within the range exceeding the GIL trigger value of 4.55 mg/L;
- Phosphate concentrations ranged from 0.062 mg/L in BH05 to 0.23 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.005 mg/L; and
- Phosphorus concentrations ranged from 0.4 mg/L in BH01 to 1.2 mg/L in BH02, the values within the range exceeding the GIL trigger value of 0.03 mg/L.

11 DISCUSSION

11.1 SOIL

There were no exceedances of the adopted criteria and the vast majority of contaminants tested were below the laboratory detection limit.

Acid sulfate soils were confirmed in both samples submitted for laboratory sPOCAS testing, exceeding the trigger limits for the requirement of the preparation and implementation of a management plan and development consent. These results are unlikely to affect the proposed development due to the sampling locations being within the proposed riparian set-back area and therefore expected to not involve excavation of soils below one metre. Further testing may be required to determine the extent of the AASS in the areas of the site that are currently unmapped in the event of undertaking excavation activities within the footprint of the proposed development.

11.2 GROUNDWATER

Groundwater sampled at the site indicated concentrations of heavy metals and nutrients, including nickel, ammonia, total nitrogen, oxides of nitrogen (nitrate and nitrite), phosphorus, and phosphate in exceedance of GIL trigger values for marine waters. The nutrient concentrations identified in the ground water samples collected and analysed are similar to results received for groundwater previously sampled by CES in the Cooks Cove Development Zone . The exceedances identified at the site are unlikely to be significant to the proposed development as use of groundwater at the site during construction and occupancy is unlikely. Further assessment of groundwater quality may be required during dewatering activities to determine appropriate disposal of groundwater collected.

Review of the groundwater flow indicated a general direction of flow towards the Cooks River. This conclusion is consistent with groundwater flow previously assessed in other areas of the Cooks Cove Development Zone. It must be noted that the groundwater levels for monitoring well BH1 were not included in the review of groundwater flow direction due to results indicating anomalous measurements. These results are likely to be caused by the observed silting of the monitoring well installation between the periods of installation and sampling. Alternatively, neighbouring construction works within the vicinity of the site may have the capacity to affect groundwater levels on the site.

12 SUMMARY AND RECOMMENDATIONS

The DESA undertaken at the site comprised an initial intrusive assessment of the underlying soils and groundwater to investigate the site suitability for the proposed mix use Enterprise and Public Recreation land use development. Systematic sampling was undertaken to determine the existence and distribution of the COPC identified within the PESA (CES, 2017). The results of this DESA did not identify any contamination.

The site is therefore considered suitable for the intended future use of the site Enterprise and Open Space. In the event the construction activities will include dewatering of the site, further investigation of groundwater quality should be undertaken to determine the appropriate groundwater disposal method. Excavation works at the site should be managed in accordance with the *Acid Sulfate Soils Management Plan, Cooks Cove Development Zone, Arncliffe and Banksia, NSW* prepared by CES (Document Reference: CES130608-BP-AZ, dated 15 February 2023), in the event excavation is undertaken.

13 REFERENCES

Ahern CR, Stone Y, and Blunden B (1998), *Acid Sulfate Soils Assessment Guidelines,* Acid Sulfate Soils Management Advisory Committee, Wollongbar, NSW

ANZECC (2000). *National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environment and Conservation Council

Consulting Earth Scientists (15 February 2023). *Acid Sulfate Soils Management Plan, Cooks Cove Development, Arncliffe & Banksia, NSW*.

Consulting Earth Scientists (2017), *Environmental Site Assessment Report, Desk Study, 19 Marsh Street, Arncliffe, NSW*.

Department of Primary Industries Office of Water Groundwater Bore Search http://allwaterdata.water.nsw.gov.au/water.stm.

Dial Before You Dig (2015). Accessed: http://www.1100.com.au/default.aspx.

Department of Mineral Resources (1983). *Sydney 1:100000 Geological Series Map*.

Environment Protection Authority NSW, 1995: *Contaminated Sites: Sampling Design Guidelines*, EPA 95/59, September 1995, 35 pp. Note that this sampling guidelines have been updated by NSW EPA (August 2022) *Contaminated Land Guidelines: Sampling design part 1 – application & Sampling design part 2 – interpretation.*

Environment Protection Authority NSW (1997): *Guidelines for Consultants Reporting on Contaminated Sites*. EPA 97/104, Environment Protection Authority of New South Wales, Chatswood, 22 pp. 2011. Note that this guidelines have been updated by NSW EPA (2020), *Contaminated Land Guidelines: Consultants Reporting on Contaminated Lan*d.

Environment Protection Authority (EPA) (2013). *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*. State of NSW and Office of Environment and Heritage (OEH).

Geological Survey of New South Wales (1983). Sydney 1:100 Geological Sheet Series 9130. Edition I, New South Wales Department of Mineral Resources, Sydney.

NEPC 1999 (2013). National Environmental Protection Measure (NEPM) *Guideline On Site Characterisation* (Schedule B2) 1999, as amended 2013.National Environmental Protection Council.

NHMRC (2008). *Guidelines for Managing Risks in Recreational Waters.* National Health and Medical Research Council.

NHMRC (2011). *Australian Drinking Water Guidelines.* National Health and Medical Research Council. This guidelines have been superseded by Australian Drinking Water Guidelines 6, 2011 Version 3.8 Updated September 2022.

NSW EPA (2023). List of Contaminated Sites Notified to EPA. NSW Government.

Hassel (2023). *Cooks Cove Urban Design Report*

14 LIMITATIONS OF THIS REPORT

This report has been prepared for use by the client who commissioned the works in accordance with the project brief and based on information provided by the client. The advice contained in this report relates only to the current project and all results, conclusions and recommendations should be reviewed by a competent person with experience in geotechnical and environmental investigations before being used for any other purpose. CES accepts no liability for use or interpretation by any person or body other than the client. This report must not be reproduced except in full and must not be amended in any way without prior approval by the client and CES.

This report does not provide a complete assessment of the environmental status of the site and is limited to the scope defined therein. It is noted that areas of the site could not be investigated due to permissions for access. Should information become available regarding conditions at the site including previously unknown sources of contamination, CES reserves the right to review the report in the context of the additional information.

Figures

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55-65 Grandview Street
Pymble, NSW, 2073
Ph 8568 2200 Fax 9983 0582

Title

Figure 1. Site Location Plan

CES Project ID:	Date:
CES130608-BP	20/02/2023
Prepared By: T.Goodbody	Checked By: D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55-65 Grandview Street
Pymble, NSW, 2073
Ph 8568 2200 Fax 9983 0582

Title

Figure 2. Site Layout Plan

CES Project ID:	Date:
CES130608-BP	20/02/2023
Prepared By: T.Goodbody	Checked By: D. Lowe

Tables

Table 1: Summary of Borehole Information

Sample Point	Date Drilled/Sampled	Easting	Northing	Ground Level (mAHD)	Termination Depth (m)
BH1	13-Jul	329929.657	6243690.387	56	19
BH2	13-Jul	329957.972	6243670.305	56	12
BH3	14-Jul	*329886.504	*6243678.441	56	10.2
BH4	17-Jul	329903.191	6243657.056	56	7.5
BH5	18-Jul	329868.672	6243646.944	56	8
HA1	17-Jul	329907.434	6243698.008	56	8
HA2	17-Jul	329944.152	6243683.682	55	7.5
HA3	17-Jul	329938.768	6243664.503	55	8
HA4	17-Jul	329925.162	6243672.896	55	7.4
HA5	17-Jul	329870.804	6243654.033	55	8

Note: Borehole coordinates were surveyed by Lynton Surveys on 13& 16 January 2018.

* Location approximate - offset 1m northeast due to obstruction at 0.8m depth.

Table 2: Groundwater Gauging Data

Well ID	Date	Coordinates		Top of Casing (TOC) Elevation	Ground Elevation	Groundwater elevation	Depth to Product	Thickness of product	Corrected Groundwater Elevation
		Easting	Northing	m AHD	m AHD	m AHD	m BTOC	m	m AHD
BH1	1-Mar-18	329929.657	6243690.387	1.66	1.73	0.330	-	0	0.330
BH2	1-Mar-18	329957.972	6243670.305	1.877	1.877	0.157	-	0	0.157
BH5	20-Feb-18	329868.672	6243646.944	1.791	1.791	0.111	-	0	0.111

Note: Borehole coordinates and elevations were provided by Lynton Surveyors (Date of survey: 13/16 January 2018).

Table 3a: Containers, preservation requirements, holding times and samples analysed - s

Parameter	Container	Recommended Preservation	Maximum holding time	Number of samples analysed
Acid digestible metals and metalloids - Total (As,Cd,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon lid	Cool to <6^{o}C	6 months	15
Mercury	Glass with Teflon lid	Cool to <6^{o}C	28 days	15
Asbestos	Bag	Nil	Indefinite	15
TPH/BTEX	Glass with Teflon lid	4oC, zero headspace	14 days	23
PAHs (total and TCLP)	Glass with Teflon lid	4oC	14 days [1]	15
OCPs	Glass with Teflon lid	Cool to <6^{o}C	14 days	15
OPPs	Glass with Teflon lid	Cool to <6^{o}C	14 days	15
PCBs	Glass with Teflon lid	Cool to <6^{o}C, dark	28 days	15
Note 1: Extraction within 14 days. Analysis within 40 days.				

Table 3b: Containers, preservation requirements, holding times and samples analysed - s

Parameter	Container	Recommended Preservation	Maximum holding time	Number of samples analysed
Dissolved metals and metalloids (As,Cd,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon lid	Cool to <6^{o}C	6 months	3
Mercury	Glass with Teflon lid	Cool to <6^{o}C	28 days	3
TPH/BTEX	Glass with Teflon lid	4oC, zero headspace	14 days	3
PAHs	Glass with Teflon lid	4oC	14 days	3
OCPs	Glass with Teflon lid	Cool to <6^{o}C	7 days	3
OPPs	Glass with Teflon lid	Cool to <6^{o}C	7days	3
Nutrients	Glass with Teflon lid	Cool to <6^{o}C, dark	7days	3
Note 1: Extraction within 14 days. Analysis within 40 days.				

Table 4: Analytical parameters, PQLs and methods - Soil

Parameter	Unit	PQL	Method based on
Metals in Soil			
As [1]	mg kg^{-1}	4	USEPA 200.7
Cd [1]	mg kg^{-1}	0.4	USEPA 200.7
Cr [1]	mg kg^{-1}	1	USEPA 200.7
Cu [1]	mg kg^{-1}	1	USEPA 200.7
Hg [2]	mg kg^{-1}	0.1	USEPA 7471A
Ni [1]	mg kg^{-1}	1	USEPA 200.7
Pb [1]	mg kg^{-1}	1	USEPA 200.7
Zn [1]	mg kg^{-1}	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPH) in Soil			
C_6-C_9 fraction	mg kg^{-1}	25	USEPA 8015B
C_{10}-C_{14} fraction	mg kg^{-1}	50	USEPA 8015B
C_{15}-C_{28} fraction	mg kg^{-1}	100	USEPA 8015B
C_{29}-C_{36} fraction	mg kg^{-1}	100	USEPA 8015B
BTEX in Soil			
Benzene	mg kg^{-1}	0.2	USEPA 8021A
Toluene	mg kg^{-1}	0.5	USEPA 8021A
Ethylbenzene	mg kg^{-1}	1	USEPA 8021A
m&p-xylene	mg kg^{-1}	2	USEPA 8021A
o-xylenes	mg kg^{-1}	1	USEPA 8021A
Organic Contaminants in Soil			
PAHs	mg kg^{-1}	0.1	USEPA 8270 SIM
Organochlorine Pesticides (OPC) in Soil			
OCPs	mg kg-1	0.1	USEPA 8081
Organophosphate Pesticides (OPP) in Soil			
OPPs	mg kg-1	0.1	USEPA 8270 or 8141
Polychlorinated Biphenyls (PCB) in Soil			
PCBs	mg kg-1	0.1	USEPA 8082
Asbestos in Soil			
Asbestos in Soil	g/kg	0.1	AS4964-2004

Note 1: Acid soluble metals by ICP-AES.
Note 2: Total recoverable mercury.

Table 5: Analytical parameters, PQLs and methods - Groundwater

Parameter	Unit	PQL	Method based on
Dissolved Metals in Groundwater			
As [1]	mg L^{-1}	1	USEPA 200.7
Cd [1]	mg L^{-1}	0.1	USEPA 200.7
Cr [1]	mg L^{-1}	1	USEPA 200.7
Cu [1]	mg L^{-1}	1	USEPA 200.7
Hg [2]	mg L^{-1}	0.05	USEPA 7471A
Ni [1]	mg L^{-1}	1	USEPA 200.7
Pb [1]	mg L^{-1}	1	USEPA 200.7
Zn [1]	mg L^{-1}	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPH) in Groundwater			
C_6-C_9 fraction	µg L^{-1}	10	USEPA 8015B
C_{10}-C_{14} fraction	µg L^{-1}	50	USEPA 8015B
C_{15}-C_{28} fraction	µg L^{-1}	100	USEPA 8015B
C_{29}-C_{36} fraction	µg L^{-1}	100	USEPA 8015B
BTEX in Groundwater			
Benzene	µg L^{-1}	1	USEPA 8021A
Toluene	µg L^{-1}	1	USEPA 8021A
Ethylbenzene	µg L^{-1}	1	USEPA 8021A
m&p-xylene	µg L^{-1}	2	USEPA 8021A
o-xylenes	µg L^{-1}	1	USEPA 8021A
Organic Contaminants in Groundwater			
PAHs	µg L^{-1}	1	USEPA 8270 SIM
Organochlorine Pesticides (OPC) in Groundwater			
OCPs	µg L^{-1}	0.2	USEPA 8081
Organophosphate Pesticides (OPP) in Groundwater			
OPPs	µg L^{-1}	0.2	USEPA 8270 or 8141
Polychlorinated Biphenyls (PCB) in Groundwater			
PCBs	µg L^{-1}	2	USEPA 8082
Nutrients in Groundwater			
Nitrate	mg L-1	0.005	APHA 4500-NH3 F
Nitrite	mg L-1	0.005	APHA 4500-NO2 B
Phosphate	mg L-1	0.005	APHA 4500
Ammonia	mg L-1	0.005	APHA 4500-NH3 F

Note 1: Acid soluble metals by ICP-AES.
Note 2: Total recoverable mercury.

Table 6: Site Assessment Criteria - Soil and Groundwater

Contaminant	HIL C[1]	HIL D[2]	HSL C[3]	HSL D[4]	EIL (Commercial and Industrial)[5]	EIL (Urban Residential and Open Public Space)[6]	GIL (Marine Waters)[7]
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/L)
TRH C6 - C9							
TRH C6 - C10							
FRACTION 1			NL	310	215	180	
TRH C10 - C14							
TRH C15 - C28							
TRH C29 - C36							
TRH total C10 - C36							
TRH C10-C36							
TRH >C10-C16							
FRACTION 2					170	120	
TRH >C16-C34							
TRH >C34-C40							
TRH total >C10-C40							
Benzene			NL	4	75	50	500
Toluene			NL	NL	135	85	
Ethylbenzene					165	70	
m+p-xylene							
o-Xylene							
Xylenes			NL	NL	180	105	
Naphthalene			NL	NL	370	170	50
Acenaphthylene							
Acenaphthene							
Fluorene							
Phenanthrene							
Anthracene							
Fluoranthene							
Pyrene							
Benzo(a)anthracene							
Chrysene							
Benzo(b+k)fluoranthene							
Benzo(a)pyrene					0.7	0.7	
Indeno(1,2,3-c,d)pyrene							
Dibenzo(a,h)anthracene							
Benzo(g,h,i)perylene							
Benzo(a)pyrene TEQ	3	40					
Total +ve	300	4000					
HCB	10	80					
alpha-BHC							
gamma-BHC							
beta-BHC							
Heptachlor	10	50					
delta-BHC							
Aldrin							
Heptachlor Epoxide							
gamma-Chlordane							
alpha-chlordane							

(continued) Table 6: Site Assessment Criteria - Soil and Groundwater

Contaminant	HIL C[1]	HIL D[2]	HSL C[3]	HSL D[4]	EIL (Commercial and Industrial)[5]	EIL (Urban Residential and Public Open Space)[6]	GIL (Marine Waters)[7]
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(ug/L)
Endosulfan I		**2000**					**0.005**
pp-DDE							
Dieldrin							
Endrin							**0.004**
pp-DDD							
Endosulfan II							
pp-DDT					**640**	**180**	
Endrin Aldehyde							
Endosulfan Sulphate							
Methoxychlor	**400**	**2500**					
Endosulfan (Endosulfan I + Endosulfan 2 + Endosulfan sulphate)							
Azinphos-methyl (Guthion)							
Bromophos-ethyl							
Chlorpyriphos	**250**	**2000**					**0.009**
Chlorpyriphos-methyl							
Diazinon							
Dichlorvos							
Dimethoate							
Ethion							
Fenitrothion							
Malathion							
Parathion							
Ronnel							
Aroclor 1016							
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248							
Aroclor 1254							
Aroclor 1260							
PCBs	**1**	**7**					
Arsenic	**300**	**3000**			**160**	**100**	
Cadmium	**20000**	**900**					**0.7**
Chromium (VI)	**300**	**3600**					**4.4**
Copper	**17000**	**240000**					**1.3**
Lead	**600**	**1500**					**4.4**
Mercury	**80**	**730**					0.1

Note 1: NEPC (1999, as amended 2013) – Schedule B1 Guideline on Investigation Levels for Soil and Groundwater, HIL C (Public Open Space)

Note 2: NEPC (1999, as amended 2013) – Schedule B1 Guideline on Investigation Levels for Soil and Groundwater, HIL D (Commercial/Industrial)

Note 3: NEPC (1999, as amended 2013) – Schedule B1 Guideline on Investigation Levels for Soil and Groundwater, HSL C (Clay, 0m to <1m)

Note 4: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Investigation Levels For Soil and Groundwater, HSL D (Clay, 0m to <1m)

Note 5: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Investigation Levels For Soil and Groundwater, EIL (Commercial/Industrial)

Note 6: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Investigation Levels For Soil and Groundwater, EIL (Urban Residential/ Public Open Space)

Note 7: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Investigation Levels For Soil and Groundwater, GIL (Marine Waters)

Table 7: QC Sample Data Acceptance Criteria

QC Sample Type	Method of Assessment	Acceptable Range
Field QC		
Blind Replicates and Split Samples	The assessment of split replicate is undertaken by calculating the Relative Percent Difference (RPD) of the replicate concentration compared with the original sample concentration. The RPD is defined as: $RPD = 100 \times \frac{\lvert X_1 - X_2 \rvert}{Average}$ Where: X_1 and X_2 are the concentration of the original and replicate samples.	The acceptable range depends upon the levels detected: ▪ 0 – 100% RPD (When the average concentration is < 5 times the LOR/EQL) ▪ 0 – 75% RPD (When the average concentration is 5 to 10 times the LOR/EQL) ▪ 0 – 50% RPD (When the average concentration is > 10 times the LOR/EQL)
Blanks (Rinsate and Trip Blanks)	Each blank is analysed as per the original samples.	Analytical Result < LOR/EQL
Laboratory-prepared Trip Spike	The trip spike is analysed after returning from the field and the % recovery of the known spike is calculated.	70% - 130%
Laboratory QC		
Laboratory Duplicates	Assessment as per Blind Replicates and Split Samples.	The acceptable range depends upon the levels detected: ▪ 0 – 100% RPD (When the average concentration is < 4 times the LOR/EQL) ▪ 0 – 50% RPD (When the average concentration is 4 to 10 times the LOR/EQL) ▪ 0 – 30% RPD (When the average concentration is > 10 times the LOR/EQL)
Surrogates Matrix Spikes Laboratory Control Samples	Assessment is undertaken by determining the percent recovery of the known spike or addition to the sample. $\% \text{ Recovery} = 100 \times \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; C = Calculated Concentration.	70% - 130% (General Analytes) 50% - 130% (Phenols) 60% - 130% (OP Pesticides) If the result is outside the above ranges, the result must be < 3x Standard Deviation of the Historical Mean (calculated over past 12 months)
Method Blanks	Each blank is analysed as per the original samples.	Analytical Result < LOR/EQL

Note: EQL = Laboratory Estimated Quantitation Limit (EQL) or the minimum detection limit for a particular analyte. LOR = Limit of Reporting or the minimum detectable limit for a particular

Table 8a: QA/QC tabulated results - Soil

					Soil Sample	BH05-3.0-3.45	Average	Blind RPD	Average	Split RPD
					Sample Type	Original				
					Laboratory report	183801				
Parameters	**Unit**	**Primary PQL**	**Blind PQL**	**Split PQL**				**%**		**%**
TRH C6 - C9	mg/kg	25	25	10	<25	N/A	N/A	N/A	N/A	N/A
TRH C6 - C10	mg/kg	25	25	10	<25	N/A	N/A	N/A	N/A	N/A
FRACTION 1	mg/kg	25	25	10	<25	N/A	N/A	N/A	N/A	N/A
TRH C10 - C14	mg/kg	50	50	50	<50	N/A	N/A	N/A	N/A	N/A
TRH C15 - C28	mg/kg	100	100	100	<100	N/A	N/A	N/A	N/A	N/A
TRH C29 - C36	mg/kg	100	100	100	<100	N/A	N/A	N/A	N/A	N/A
TRH >C10-C16	mg/kg	50	50	50	<50	N/A	N/A	N/A	N/A	N/A
FRACTION 2	mg/kg	50	50	50	<50	N/A	N/A	N/A	N/A	N/A
TRH >C16-C34	mg/kg	100	100	100	<100	N/A	N/A	N/A	N/A	N/A
TRH >C34-C40	mg/kg	100	100	100	<100	N/A	N/A	N/A	N/A	N/A
Benzene	mg/kg	0.2	0.2	0.2	<0.2	N/A	N/A	N/A	N/A	N/A
Toluene	mg/kg	0.5	0.5	0.5	<0.5	N/A	N/A	N/A	N/A	N/A
Ethylbenzene	mg/kg	1	1	0.5	<1	N/A	N/A	N/A	N/A	N/A
m+p-xylene	mg/kg	2	2	0.5	<2	N/A	N/A	N/A	N/A	N/A
o-Xylene	mg/kg	1	1	0.5	<1	N/A	N/A	N/A	N/A	N/A
Naphthalene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Acenaphthylene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Acenaphthene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Fluorene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Phenanthrene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Anthracene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Fluoranthene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Pyrene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Chrysene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Benzo(b+k)fluoranthene	mg/kg	0.2	0.2	0.5	<0.2	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	mg/kg	0.05	0.05	0.5	<0.05	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene	mg/kg	0.1	0.1	0.5	<0.1	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene TEQ	mg/kg	0.5	0.5	0.5	<0.5	N/A	N/A	N/A	N/A	N/A
Total +ve	mg/kg	-	-	0.5	<0.05	N/A	N/A	N/A	N/A	N/A
HCB	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
alpha-BHC	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
gamma-BHC	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
beta-BHC	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Heptachlor	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
delta-BHC	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Aldrin	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Heptachlor Epoxide	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
gamma-Chlordane	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
alpha-chlordane	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Endosulfan I	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
pp-DDE	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Dieldrin	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Endrin	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
pp-DDD	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Endosulfan II	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
pp-DDT	mg/kg	0.1	0.1	0.2	<0.1	N/A	N/A	N/A	N/A	N/A
Endrin Aldehyde	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Endosulfan Sulphate	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Methoxychlor	mg/kg	0.1	0.1	0.2	<0.1	N/A	N/A	N/A	N/A	N/A
Azinphos-methyl (Guthion)	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Bromophos-ethyl	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Chlorpyriphos	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Chlorpyriphos-methyl	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Diazinon	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Dichlorvos	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Dimethoate	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Ethion	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Fenitrothion	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Malathion	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Parathion	mg/kg	0.1	0.1	0.2	<0.1	N/A	N/A	N/A	N/A	N/A
Ronnel	mg/kg	0.1	0.1	0.05	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1016	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1221	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1232	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1242	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1248	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1254	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Aroclor 1260	mg/kg	0.1	0.1	0.1	<0.1	N/A	N/A	N/A	N/A	N/A
Arsenic	mg/kg	4	4	5	<4	N/A	N/A	N/A	N/A	N/A
Cadmium	mg/kg	0.4	0.4	1	<0.4	N/A	N/A	N/A	N/A	N/A
Chromium	mg/kg	1	1	2	5	4	50.0%	4.5	22%	
Copper	mg/kg	1	1	5	<1	N/A	N/A	N/A	N/A	N/A
Zinc	mg/kg	1	1	5	2	2	0.0%	2.0	N/A	

Table 8b: QA/QC tabulated results - Groundwater

				Soil Sample	**BH2**	**QAQC 1**	**QAQC 2**	**Average**	**Blind RPD**	**Average**	**Blind RPD**
				Sample Type	Original	Blind replicate	Split replicate				
				Laboratory report	186375	186375	ES1806787				
Parameters	**Unit**	**Primary PQL**	**Blind PQL**	**Split PQL**				µg/L	**%**	µg/L	**%**
TRH C6 - C9	µg/L	10	10	20	<10	<10	<20	N/A	N/A	N/A	N/A
TRH C6 - C10	µg/L	10	10	10	<10	<10	<10	N/A	N/A	N/A	N/A
FRACTION 1	µg/L	10	10	10	<10	<10	<10	N/A	N/A	N/A	N/A
TRH C10 - C14	µg/L	50	50	50	<50	<50	<50	N/A	N/A	N/A	N/A
TRH C15 - C28	µg/L	100	100	100	<100	<100	<100	N/A	N/A	N/A	N/A
TRH C29 - C36	µg/L	100	100	50	<100	<100	<50	N/A	N/A	N/A	N/A
TRH >C10-C16	µg/L	50	50	100	<50	<50	<100	N/A	N/A	N/A	N/A
FRACTION 2	µg/L	50	50	100	<50	<50	<100	N/A	N/A	N/A	N/A
TRH >C16-C34	µg/L	100	100	100	<100	<100	<100	N/A	N/A	N/A	N/A
TRH >C34-C40	µg/L	100	100	100	<100	<100	<100	N/A	N/A	N/A	N/A
										N/A	N/A
Benzene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Toluene	µg/L	1	1	2	<1	<1	<2	N/A	N/A	N/A	N/A
Ethylbenzene	µg/L	1	1	2	<1	<1	<2	N/A	N/A	N/A	N/A
m+p-xylene	µg/L	2	2	2	<2	<2	<2	N/A	N/A	N/A	N/A
o-Xylene	µg/L	1	1	2	<1	<1	<2	N/A	N/A	N/A	N/A
										N/A	N/A
Naphthalene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Acenaphthylene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Acenaphthene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Fluorene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Phenanthrene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Anthracene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Fluoranthene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Pyrene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Benzo(a)anthracene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Chrysene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Benzo(b+k)fluoranthene	µg/L	2	2	1	<2	<2	<2	N/A	N/A	N/A	N/A
Benzo(a)pyrene	µg/L	1	1	0.5	<1	<1	<0.5	N/A	N/A	N/A	N/A
Indeno(1,2,3-c,d)pyrene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Benzo(a)pyrene TEQ	µg/L	5	5	0.5	<5	<5	<0.5	N/A	N/A	N/A	N/A
Total +ve	µg/L	1	1	0.5	NIL (+)VE	NIL (+)VE	<0.5	N/A	N/A	N/A	N/A
										N/A	N/A
HCB	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
alpha-BHC	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
gamma-BHC	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
beta-BHC	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Heptachlor	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
delta-BHC	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Aldrin	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Heptachlor Epoxide	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
gamma-Chlordane	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
alpha-chlordane	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Endosulfan I	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
pp-DDE	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Dieldrin	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Endrin	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
pp-DDD	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Endosulfan II	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
pp-DDT	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Endrin Aldehyde	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Endosulfan Sulphate	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Methoxychlor	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
										N/A	N/A
Azinphos-methyl (Guthion)	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Bromophos-ethyl	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Chlorpyriphos	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Chlorpyriphos-methyl	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Diazinon	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Dichlorvos	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Dimethoate	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Ethion	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Fenitrothion	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Malathion	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Parathion	µg/L	0.2	0.2	2	<0.2	<0.2	<2	N/A	N/A	N/A	N/A
Ronnel	µg/L	0.2	0.2	0.5	<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
										N/A	N/A
Total Nitrogen in water	mg/L	0.1	0.1	0.1	18	18	18.1	18	0.0%	18.05	N/A
NOx as N in water	mg/L	0.005	0.005	0.01	0.3	0.3	0.33	0.3	0.0%	0.315	N/A
Ammonia as N in water	mg/L	0.005	0.005	0.01	12	11	11.7	11.5	8.7%	11.85	N/A
Phosphate as P in water	mg/L	0.005	0.005	-	0.23	0.21	nt	0.22	9.1%	0.23	N/A
Phosphorus - Total	mg/L	0.05	0.05	0.01	1.2	1.3	0.51	1.25	8.0%	0.855	N/A
										N/A	N/A
Arsenic	µg/L	1	1	1	5	5	5	5	0.0%	5	N/A
Cadmium	µg/L	0.1	0.1	0.1	<0.1	<0.1	<0.1	N/A	N/A	N/A	N/A
Chromium	µg/L	1	1	1	7	7	6.00	7	0.0%	6.5	N/A
Copper	µg/L	1	1	1	<1	2	<1	2	N/A	N/A	N/A
Lead	µg/L	1	1	1	<1	<1	<1	N/A	N/A	N/A	N/A
Mercury	µg/L	0.05	0.05	0.1	<0.05	<0.05	<0.1	N/A	N/A	N/A	N/A

Table 9 - Soil Analytical Results

Sample Location			BH1	BH2						BH3	BH4		BH5					HA4	NEPM (2013) HIL – Public Open Space C	NEPM (2013) HIL - Commercial /Industrial D	NEPM (2013) HSL - D: Low - Commercial /Industrial - sand; 0 - <1m	NEPM (2013) EIL : Commercial /Industrial	NEPM (2013) HSL Asbestos (commercial/industrial)
Depth (m)			3.0	4.5-4.95	4.5-4.95	7.5-7.9	10.5-10.95		16.5-16.95	0.5	1.0	5-5.45	3.0-3.45	12.0-12.45	15.0-15.45	19.5-19.95	22.5-22.95	1.0-1.1					
Date Sampled			22-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18		25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	23-Jan-18	23-Jan-18	23-Jan-18	24-Jan-18	24-Jan-18	22-Jan-18					
Unit				Natural	Natural	Natural	Natural		Natural	Fill	Fill	Natural	Fill	Natural	Natural	Natural	Natural	Fill					
Laboratory report			183677	184000-A	184000-A	184000-A	184000-A		184000-A	184000-A	184000-A	184000-A	183801	183801	183801	183905-A	183905-A	183677					
Sample Type			N	N	R	N	N		N	N	N	N	N	N	N	N	N	N					
Parameters	**Unit**	**PQL**																					
TRH C6 - C9	mg/kg	25	<25	37	<25	<25	<25		<25	<25	<25	<25	<25	<25	6	<25	72	<25					
TRH C6 - C10	mg/kg	25	<25	120	88	<25	<25		43	<25	<25	<25	<25	34	<25	<25	240	<25					
FRACTION 1	mg/kg	25	<25	**120**	**86**	<25	<25		43	<25	<25	<25	<25	34	<25	<25	**220**	<25			**310**	**215**	
TRH C10 - C14	mg/kg	50	<50	89	110	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	180	<50					
TRH C15 - C28	mg/kg	100	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100					
TRH C29 - C36	mg/kg	100	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100	<100	<100					
TRH C10-C36	mg/kg	100	<100	89	110	<100	<100		<100	<100	<100	<100	<100	<100	<100	<100	180	<100					
TRH >C10-C16	mg/kg	50	<50	<50	56	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	94	<50					
FRACTION 2	mg/kg	50	<50	<50	56	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50	94	<50			**NL**	**170**	
TRH >C16-C34	mg/kg	100	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100	-	<100	<100	<100					
TRH >C34-C40	mg/kg	100	<100	<100	<100	<100	<100		<100	<100	<100	<100	<100	<100	30	<100	<100	<100					
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			**4**	**75**	
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			**NL**	**35**	
Ethylbenzene	mg/kg	1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	NL	<1	1	<1			**NL**	**165**	
m+p-xylene	mg/kg	2	<2	3	2	<2	<2		<2	<2	<2	<2	<2	<2	<2	<2	11	<2					
o-Xylene	mg/kg	1	<1	1	<1	<1	<1		<1	<1	<1	<1	<1	<1	-	<1	4	<1					
Xylenes	mg/kg	2	<1	4	2	<1	<1		<1	<1	<1	<1	<2	<2	<2	<2	16	<1					
Naphthalene	mg/kg	0.1	<0.1	0.3	0.2	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1			**NL**	**370**	
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Phenanthrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					

CONSULTING EARTH SCIENTISTS

Table 9 - Soil Analytical Results

Sample Location			BH1	BH2						BH3	BH4		BH5					HA4	NEPM (2013) HIL – Public Open Space C	NEPM (2013) HIL - Commercial /Industrial D	NEPM (2013) HSL - D: Low - Commercial /Industrial - sand; 0 - <1m	NEPM (2013) EIL : Commercial /Industrial	NEPM (2013) HSL Asbestos (commercial/industrial)
Depth (m)			3.0	4.5-4.95	4.5-4.95	7.5-7.9	10.5-10.95		16.5-16.95	0.5	1.0	5-5.45	3.0-3.45	12.0-12.45	15.0-15.45	19.5-19.95	22.5-22.95	1.0-1.1					
Date Sampled			22-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18		25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	23-Jan-18	23-Jan-18	23-Jan-18	24-Jan-18	24-Jan-18	22-Jan-18					
Unit				Natural	Natural	Natural	Natural		Natural	Fill	Fill	Natural	Fill	Natural	Natural	Natural	Natural	Fill					
Laboratory report			183677	184000-A	184000-A	184000-A	184000-A		184000-A	184000-A	184000-A	184000-A	183801	183801	183801	183905-A	183905-A	183677					
Sample Type			N	N	R	N	N		N	N	N	N	N	N	N	N	N	N					
Parameters	**Unit**	**PQL**																					
Fluoranthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.2	<0.1	<0.1	<0.1	<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	<0.1		<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Chrysene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(b+k)fluoranthene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					
Benzo(a)pyrene	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				**0.7**	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Benzo(a)pyrene TEQ	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	**3**	**40**			
Total +ve	mg/kg	-	<0.05	0.3	0.2	<0.05	<0.05		<0.05	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.4	<0.05	**300**	**4,000**			
HCB	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**10**	**80**			
alpha-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
gamma-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
beta-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**10**	**50**			
delta-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Heptachlor Epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
gamma-Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
alpha-chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Endosulfan I	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**340**	**2,000**			
pp-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dieldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					

CONSULTING EARTH SCIENTISTS

Table 9 - Soil Analytical Results

Sample Location			BH1	BH2						BH3	BH4		BH5					HA4	NEPM (2013) HIL – Public Open Space C	NEPM (2013) HIL - Commercial /Industrial D	NEPM (2013) HSL - D: Low - Commercial /Industrial - sand; 0 - <1m	NEPM (2013) EIL : Commercial /Industrial	NEPM (2013) HSL Asbestos (commercial/industrial)
Depth (m)			3.0	4.5-4.95	4.5-4.95	7.5-7.9	10.5-10.95		16.5-16.95	0.5	1.0	5-5.45	3.0-3.45	12.0-12.45	15.0-15.45	19.5-19.95	22.5-22.95	1.0-1.1					
Date Sampled			22-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18		25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	23-Jan-18	23-Jan-18	23-Jan-18	24-Jan-18	24-Jan-18	22-Jan-18					
Unit				Natural	Natural	Natural	Natural		Natural	Fill	Fill	Natural	Fill	Natural	Natural	Natural	Natural	Fill					
Laboratory report			183677	184000-A	184000-A	184000-A	184000-A		184000-A	184000-A	184000-A	184000-A	183801	183801	183801	183905-A	183905-A	183677					
Sample Type			N	N	R	N	N		N	N	N	N	N	N	N	N	N	N					
Parameters	**Unit**	**PQL**																					
Endrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
pp-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Endosulfan II	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					
pp-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				**640**	
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Endosulfan Sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**400**	**2,500**			
Azinphos-methyl (Guthion)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Bromophos-ethyl	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Chlorpyriphos	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**250**	**2000**			
Chlorpyriphos-methyl	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Diazinon	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					
Dichlorvos	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Dimethoate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Ethion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Fenitrothion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Malathion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Parathion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Ronnel	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Aroclor 1016	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Aroclor 1232	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					
Aroclor 1242	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					
Aroclor 1248	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1					

CONSULTING EARTH SCIENTISTS

Table 9 - Soil Analytical Results

Sample Location			BH1	BH2						BH3	BH4			BH5					HA4	NEPM (2013) HIL – Public Open Space C	NEPM (2013) HIL - Commercial /Industrial D	NEPM (2013) HSL - D: Low - Commercial /Industrial - sand; 0 - <1m	NEPM (2013) EIL : Commercial /Industrial	NEPM (2013) HSL Asbestos (commercial/industrial)
Depth (m)			3.0	4.5-4.95	4.5-4.95	7.5-7.9	10.5-10.95		16.5-16.95	0.5	1.0	5-5.45		3.0-3.45	12.0-12.45	15.0-15.45	19.5-19.95	22.5-22.95	1.0-1.1					
Date Sampled			22-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18		25-Jan-18	25-Jan-18	25-Jan-18	25-Jan-18		23-Jan-18	23-Jan-18	23-Jan-18	24-Jan-18	24-Jan-18	22-Jan-18					
Unit				Natural	Natural	Natural	Natural		Natural	Fill	Fill	Natural		Fill	Natural	Natural	Natural	Natural	Fill					
Laboratory report			183677	184000-A	184000-A	184000-A	184000-A		184000-A	184000-A	184000-A	184000-A		183801	183801	183801	183905-A	183905-A	183677					
Sample Type			N	N	R	N	N		N	N	N	N		N	N	N	N	N	N					
Parameters	**Unit**	**PQL**																						
Arsenic	mg/kg	4	7	<4	<4	<4	<4		10	<4	<4	<4		<4	<4	-	73	<4	<4	**300**	**3,000**		**160**	
Cadmium	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4	<0.4		<0.4	<0.4	<0.4	<0.4		<0.4	<0.4	-	<0.4	<0.4	<0.4	**20,000**	**900**			
Chromium	mg/kg	1	11	5	5	2	1		13	3	2	3		5	5	-	13	2	4	**300**	**3,600**		**320**	
Copper	mg/kg	1	3	<1	<1	<1	<1		3	9	4	<1		<1	2	-	<1	<1	2	**17,000**	**240,000**		**330**	
Lead	mg/kg	1	5	3	2	<1	1		6	16	5	<1		3	5	-	6	<1	3	**600**	**1,500**		**1800**	
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	0.2	<0.1	<0.1		<0.1	<0.1	-	<0.1	<0.1	<0.1	**80**	**730**			
Nickel	mg/kg	1	4	<1	1	<1	<1		1	3	1	1		2	<1	-	<1	<1	4	**1,200**	**6,000**		**460**	
Zinc	mg/kg	1	10	<1	<1	1	<1		13	41	23	<1		2	<1	<1	3	<1	36	**30,000**	**400,000**		**1,200**	
Asbestos ID	g/kg	0.1	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected		No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected				**0.05**
[1]Groundwater investigation levels for Marine Waters (Schedule B1, NEPM)	-	-	No asbestos detected	No asbestos detected	nt	No asbestos detected	No asbestos detected		No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected		No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected				**0.001**

na- not analysed

Bold - indicates exceedance of criteria value

Health investigation levels for Public Space land use (Schedule B1, NEPM)

Health investigation levels for Commercial/Industrial land use (Schedule B1, NEPM)

Health screening levels for Commercial/Industrial land use for sand 0 m - <1m (Schedule B1, NEPM)

Ecological Investigation Level for Commercial/Industrial land use (Schedule B1, NEPM/ CSIRO EIL Calculation Spreadsheet))

CONSULTING EARTH SCIENTISTS

Table 10: Groundwater Analytical Results

Sample Location			BH01		BH02	NEPM (2013) GIL - Marine Waters [1]	NEPM (2013) HSL - Commercial/Industrial 2 m to <4 m
Date Sampled			1-Mar-18	1-Mar-18	1-Mar-18		
Laboratory report			186375	186375	186375		
Sample Type			N	REP	N		
Parameters	**Unit**	**PQL**					
TRH C6 - C9	µg/L	10	<10	<10	<10	-	-
TRH C6 - C10	µg/L	10	<10	<10	<10	-	-
FRACTION 1	µg/L	10	<10	<10	<10	-	6
TRH C10 - C14	µg/L	50	<50	<50	<50	-	-
TRH C15 - C28	µg/L	100	<100	<100	<100	-	-
TRH C29 - C36	µg/L	100	<100	<100	<100	-	-
TRH total C10 - C36	µg/L	100	<100	<100	<100	-	-
TRH >C10-C16	µg/L	50	<50	<50	<50	-	-
FRACTION 2	µg/L	50	<50	<50	<50	-	NL
TRH >C16-C34	µg/L	100	<100	<100	<100	-	-
TRH >C34-C40	µg/L	100	<100	<100	<100	-	-
TRH total >C10-C40	µg/L	100	<100	<100	<100	-	-
							-
Benzene	µg/L	1	<1	<1	<1	500 [MR]	30
Toluene	µg/L	1	<1	<1	<1	-	NL
Ethylbenzene	µg/L	1	<1	<1	<1	-	NL
m+p-xylene	µg/L	2	<2	<2	<2	-	-
o-Xylene	µg/L	1	<1	<1	<1	-	-
Xylenes	µg/L	2	<2	<2	<2	-	NL
Naphthalene	µg/L	1	<1	<1	<1	50 [MR]	-
Acenaphthylene	µg/L	1	<1	<1	<1	-	-
Acenaphthene	µg/L	1	<1	<1	<1	-	-
Fluorene	µg/L	1	<1	<1	<1	-	-
Phenanthrene	µg/L	1	<1	<1	<1	-	-
Anthracene	µg/L	1	<1	<1	<1	-	-
Fluoranthene	µg/L	1	<1	<1	<1	-	-
Pyrene	µg/L	1	<1	<1	<1	-	-
Benzo(a)anthracene	µg/L	1	<1	<1	<1	-	-
Chrysene	µg/L	1	<1	<1	<1	-	-
Benzo(b+k)fluoranthene	µg/L	2	<2	<2	<2	-	-
Benzo(a)pyrene	µg/L	1	<1	<1	<1	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	<1	-	-
Dibenzo(a,h)anthracene	µg/L	1	<1	<1	<1	-	-
Benzo(g,h,i)perylene	µg/L	1	<1	<1	<1	-	-
Benzo(a)pyrene TEQ	µg/L	5	<5	<5	<5	-	-
Total +ve	µg/L	1	NIL (+)VE	NIL (+)VE	NIL (+)VE	-	-
HCB	µg/L	0.2	<0.2	<0.2	<0.2	-	-
alpha-BHC	µg/L	0.2	<0.2	<0.2	<0.2	-	-
gamma-BHC	µg/L	0.2	<0.2	<0.2	<0.2	-	-
beta-BHC	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Heptachlor	µg/L	0.2	<0.2	<0.2	<0.2	-	-

(continued) Table 10: Groundwater Analytical Results - continued

Sample Location			BH01		BH02	NEPM (2013) GIL - Marine Waters [2]	NEPM (2013) HSL - Commercial/Industrial 2 m to <4 m
Date Sampled			1-Mar-18	1-Mar-18	1-Mar-18		
Laboratory report			186375	186375	186375		
Sample Type			N	REP	N		
delta-BHC	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Aldrin	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Heptachlor Epoxide	µg/L	0.2	<0.2	<0.2	<0.2	-	-
gamma-Chlordane	µg/L	0.2	<0.2	<0.2	<0.2	-	-
alpha-chlordane	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Endosulfan I	µg/L	0.2	<0.2	<0.2	<0.2	0.005 MR	-
pp-DDE	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Dieldrin	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Endrin	µg/L	0.2	<0.2	<0.2	<0.2	0.004 MR	-
pp-DDD	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Endosulfan II	µg/L	0.2	<0.2	<0.2	<0.2	-	-
pp-DDT	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Endrin Aldehyde	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Endosulfan Sulphate	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Methoxychlor	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Azinphos-methyl (Guthion)	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Bromophos-ethyl	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Chlorpyriphos	µg/L	0.2	<0.2	<0.2	<0.2	0.009 HR	-
Chlorpyriphos-methyl	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Diazinon	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Dichlorvos	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Dimethoate	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Ethion	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Fenitrothion	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Malathion	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Parathion	µg/L	0.2	<0.2	<0.2		-	-
Ronnel	µg/L	0.2	<0.2	<0.2	<0.2	-	-
Total Nitrogen in water	mg/L	0.1	**9.1**	nt	**18**	0.30 [a]	-
NOx as N in water	mg/L	0.005	**0.05**	nt	**0.3**	0.015 [a]	-
Ammonia as N in water	mg/L	0.005	5.2	nt	12	4.55 [b]	-
Arsenic	µg/L	0.1	<0.1	nt	<0.1	0.7	-
Cadmium	µg/L	1	<1	nt	7	27	-
Chromium	µg/L	1	2	nt	<1	1.3	-
Lead	µg/L	1	<1	nt	<1	4.4	-
Mercury	µg/L	0.05	<0.05	<0.05	<0.05	0.1	-
Nickel	µg/L	1	2	nt	2	7	-
Zinc	µg/L	1	6	nt	4	15	-

Notes:

nt- not tested

NL- not limiting

[1]Groundwater investigation levels for Marine Waters (Schedule B1, NEPM)

Table 11: Photoionisaton Detecter (PID) Screening Results

Depth (mbgl)	0.5	1.0	1.5	2.0	2.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
Borehole Location ID	**PID Screening Results (ppm)**																							
BH1	-	0.2	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-
BH2	-	2.2	-	0.3	-	-	78.4	-	-	45.4	-	-	103.2	-	-	7.9	-	-	7.0	-	-	7.6	-	-
BH3	26.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	-	6.7	-	1.9	-	0.6	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	-					-	253.1	-	-	45.5	-	-	3.2	-	-	14.8	-	-	5.2	-	-	230.2	-	-
HA4	0.3	0.2	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Depth (mbgl)	13.5	14.0	14.5	15.0	15.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0	25.5
Borehole Location ID	**PID Screening Results (ppm) (continued)**																						
BH1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH2	5.7	-	-	40.6	-	-	-	4.9	-	-	0.7	-	-	1.0	-	-	353.5	-	-	-	-	-	-
BH3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH5	93.3	-	-	245	-	-	-	3.2	-	-	15.9	-	-	9.7	-	-	748	-	-	-	-	-	98
HA4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 12: Soil analytical results - sPOCAS

Parameters				TAA (mol H+/tonne)	TPA (mol H+/tonne)	S-POS (%)	TSA (mol H+/tonne)	Liming Rate (kg $CaCO_3$/tonne)
Sample	**Date**	**Borehole**	**Material**					
BH02-1.5	23-Jan-18	BH02	Gravelly sand	<5	**120**	**0.36**	120	12
BH02-3.25-3.45	23-Jan-18	BH02	Clayey sand	<5	**190**	**0.35**	190	15
Action Criteria (1 - 1000 tonnes)		Sands to loamy sands		-	**18**	**0.03**	-	-
		Sandy loams to light clays		-	**36**	**0.06**	-	-
		Medium to heavy clays		-	**62**	**0.1**	-	-
Action Criteria (>1000 tonnes)		Sands to loamy sands		-	**18**	**0.03**	-	-
		Sandy loams to light clays		-	**18**	**0.03**	-	-
		Medium to heavy clays		-	**18**	**0.03**	-	-

Note: Concentrations over action criteria are highlighted and shown in bold text.

Appendix A
Proposed Development Plans

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title

Figure 4. Proposed Development Plan

CES Project ID:	Date:
CES130608-BP	20/02/2023
Prepared By: T. Goodbody	Checked By: D.Lowe

Appendix B
Borehole Logs

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Ltd
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

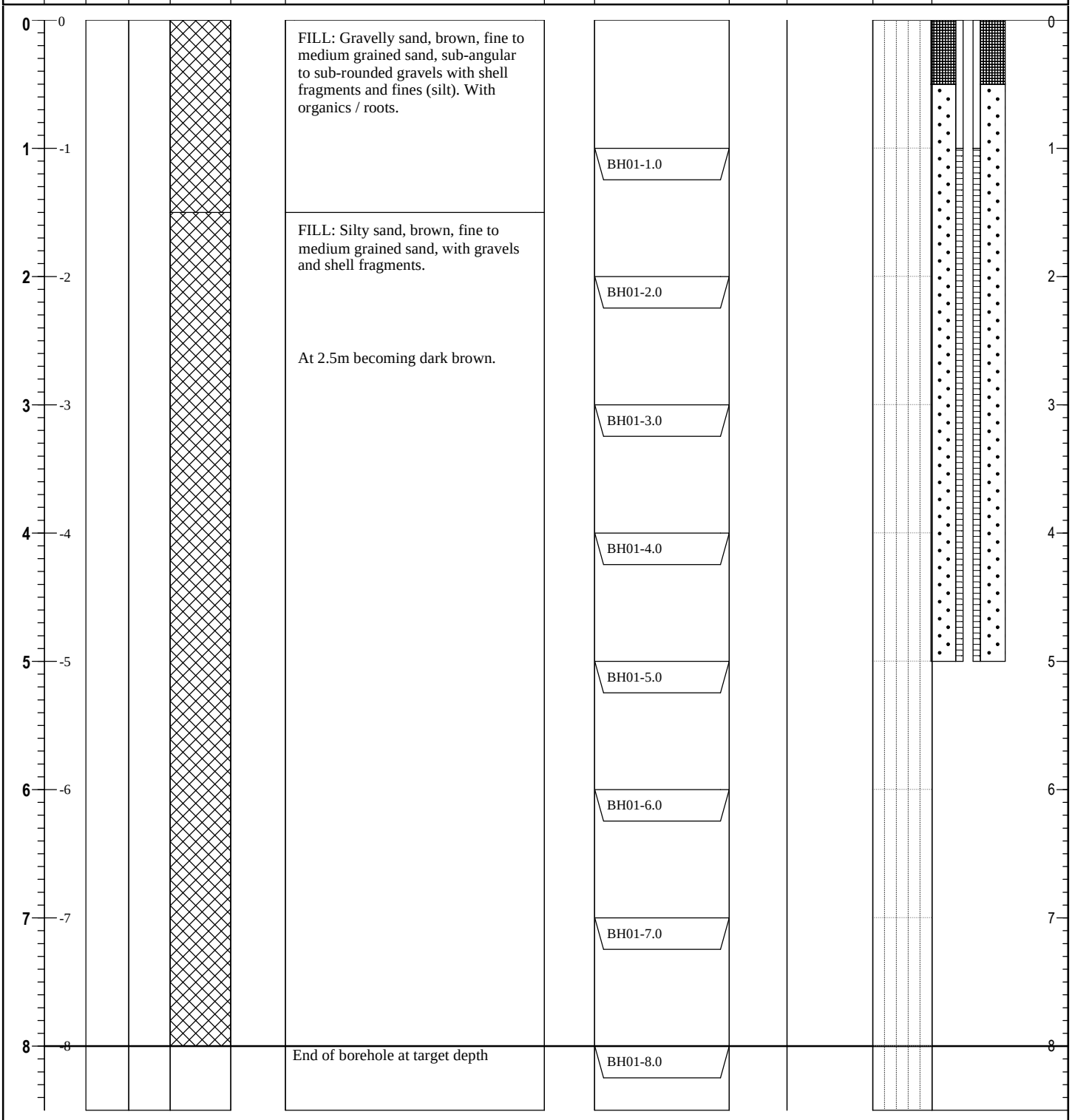
CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH01

Sheet: 1/1

X-Coord:	329929.657	GDA 94 MGA 56	**Date Commenced:**	22/01/2018	**Logged by:** EM
Y-Coord:	6243690.387		**Date Completed:**	22/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.73	m AHD	**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	0					FILL: Gravelly sand, brown, fine to medium grained sand, sub-angular to sub-rounded gravels with shell fragments and fines (silt). With organics / roots.						
1	-1							BH01-1.0				
						FILL: Silty sand, brown, fine to medium grained sand, with gravels and shell fragments.						
2	-2							BH01-2.0				
						At 2.5m becoming dark brown.						
3	-3							BH01-3.0				
4	-4							BH01-4.0				
5	-5							BH01-5.0				
6	-6							BH01-6.0				
7	-7							BH01-7.0				
8	-8					End of borehole at target depth		BH01-8.0				



Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith
Machine Type:	Truck mounted rig	**Operators Licence No.:**	

Refer to Standard Sheets for details of abbreviations

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH02

Sheet: 1/1

X-Coord:	329958	GDA 94 MGA 56	**Date Commenced:**	23/01/2018	**Logged by:** EM
Y-Coord:	6245670.3		**Date Completed:**	25/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.877 m AHD		**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa)	Well Installation Detail
0	0					Topsoil: Silty sand, fine to coarse grained, sub-angular to sub-rounded sand, low plasticity, organics and roots.						
1	-1					FILL: Silty clayey sand, medium to coarse grained sub-angular to sub-rounded sand, medium plasticity clay, with shells and fine grained trace gravels.		BH2-1.0 BH2-2.0				
2	-2					Gravel and Sand: Brown grey, fine to coarse grained sub-angular to sub-rounded sand, fien to coarse grained sub-angular to sub-rounded gravels, with shells and fines (silt), gravels comprise cementation.		BH2-3-3.25				
3	-3					Silty CLAY: Dark grey, medium plasticity clay, marine sediment odour.		BH2-3.25-3.45		SPT 1 @3-3.45 m 2,1,0 N=1		
4	-4					Silty SAND: Brown, fine to medium grained, sub-angular to sub-rounded sand, low plasticity silts.		BH2-4.5-4.95		SPT 2 @ 4.45-4.95m 0,0,3 N=3		
5	-5					Clayey Sand: Dark grey, fine to medium grained sub-angular to sub-rounded sand, medium plasticity clay.						
6	-6					Clayey Sand: Pale grey to dark grey, fine to medium grained sub-angular to sub-rounded sand, medium plasticity clay.		BH2-6-6.27		SPT 3 @ 6-6.45m 14,30/120mm N=R		
7	-7					Sand: Pale grey to green grey, fine to medium grained sub-angular to sub-rounded sand, with fines.						
8	-8					Sand: Pale grey with yellow grey streaks,		BH2-7.5-7.9		SPT 4 @ 7.5-7.9m 17,36,18/100mm N=R		
9	-9							BH2-9-9.45		SPT 5 @ 9-9.45m 2,0,6 N=6		
10	-10					Clayey Sand: Pale grey/white, fine to medium grained sub-angular to sub-rounded sand, medium to high plasticity clay.						
11	-11					At 10.90m becoming mottled yellow brown/ pale grey.		BH2-10.5-10.95		SPT 6 @ 10.5-10.95m 8,1,15 N=26		
12	-12											

Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith
Machine Type:	Truck mounted rig	**Operators Licence No.:**	

Refer to Standard Sheets for details of abbreviations

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH02

Sheet: 1/1

X-Coord:	329958	GDA 94 MGA 56	**Date Commenced:**	23/01/2018	**Logged by:** EM
Y-Coord:	6245670.3		**Date Completed:**	25/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.877 m AHD		**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
12	-12					Silty CLAY: Pale grey, high plasticity clay, very stiff, dry.		BH2-12-12.45		SPT 7 @ 12-12.45m 7,13,15 N=28		
13	-13					Sandy CLAY: Pale grey, high plasticity clay, fine to medium grained sub-angular to sub-rounded sand.		BH2-13.5-13.95		SPT 8 @ 13.5-13.95m 6,10,9 N=19		
14	-14											
15	-15							BH2-15-15.45		SPT 9 @ 15-15.45m 7,8,11 N=19		
16	-16											
17	-17					Sand: Red brown, fine to coarse grained sub-angular to sub-rounded sand with low plasticity fines.		BH2-16.5-16.95		SPT 10 @ 16.5-16.95m N=R		
18	-18							BH2-18-18.45		SPT 11 @ 18-18.45m 30-50mm (HB) N=R		
19	-19											
20	-20					Sandstone: White/pale grey, fine to coarse grained sub-angular to sub-rounded sand, compact [recovered as sand].		BH2-19.5-19.95		SPT 12 @ 19.5-19.95m 11,17,23 N=40		
21	-21					Sandstone: Red brown / white, fine to coarse grained sub-angular to sub-rounded sand, with fines [recovered as sand].		BH2-21-21.45		SPT 13 @ 21-21.35m 28,30,14/50mm N=R		
22	-22											
23	-23					Terminated at 22.58m		BH2-22.5-22.58		SPT 14 @ 22.5-22.58m 20/80mm (HB)		

Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith	Refer to Standard Sheets for details of abbreviations
Machine Type:	Truck mounted rig	**Operators Licence No.:**		

Project ID:	CES130608-BP	**Easting:**	329886.504
Project:	Lot 10 Detailed Site Investigation	**Northing:**	6243678.441
Client:	Boyd Properties Pty Ltd	**Elevation:**	1.349
Location:	19 Marsh Street, Arncliffe	**Environmental Log:**	**BH03**

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0.0	NDD			Topsoil: Cement stabilised soil roadbase Silty sand, fine to coarse grained, sub-angular to sub-rounded sand, low plasticity, medium grained sub-rounded gravels, with shells				
0.5					BH3-0.5			
				Obstruction (concrete pipe) @ 0.8m End of borehole.				
1.0								

Drill Company:	Hagstrom Drilling	**Date Commenced:**	25/01/2018
Drill Model:	Hydrapower Scout	**Date Completed:**	25/01/2018
Hole Diameter (mm):	200	**Logged/checked by:**	EM / IW

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH04

Sheet: 1/1

X-Coord:	329903.19	GDA 94 MGA 56	**Date Commenced:**	25/01/2018	**Logged by:** 6243657.056
Y-Coord:	6243670.3		**Date Completed:**	25/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.861	m AHD	**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	0					Topsoil: Sand, fine to medium grained, sub-angular to sub-rounded sand, trace fines.						
1	-1					Sand: Brown to dark grey, fine to medium grained, sub-angular to sub-rounded sand, with fines. At 1.0m becoming brown.		BH4-1.0 BH4-2.0				
2	-2					Sand: Dark grey, fine to medium grained sub-angular to sub-rounded sand, with fines (clay), medium plasticity clay.		BH4-3-3.45				
3	-3					Sand: Dark grey-brown, fine to coarse grained, sub-angular to sub-rounded sand, trace seashells. moist.		BH4-4-4.45		SPT 1 @3-3.45 m 3,2,3 N=5		
4	-4									SPT 2 @ 4-4.45m 3,3,4 N=7		
5	-5							BH4-5-5.45		SPT 3 @ 5-5.45m 6,9,14 N=23		
6	-6					Terminated at 5.45m						

Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith	Refer to Standard Sheets for details of abbreviations
Machine Type:	Truck mounted rig	**Operators Licence No.:**		

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH05

Sheet: 1/1

X-Coord:	329868.672	GDA 94 MGA 56	**Date Commenced:**	23/01/2018	**Logged by:** EM
Y-Coord:	6243646.94		**Date Completed:**	23/01/2018	**Checked by:** IW
Surface Elevation (R.L.) :	1.791 m AHD		**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	0					Roadbase: Silty Sandy Gravel, pale grey to grey, fine to coarse grained sub-angular to angular gravels, fine to coarse grained sub-angular sand, with clay, compact, dry.						
						FILL: Sandy gravel fill / wastes. comprising timber block >200mm. aluminium cans. At 0.8m boulder encountered						
3	-3					Silty SAND: dark grey / brown grey, fine to coarse grained sub-anglar to sub-rounded sand, low plasticity silt.		BH5-3.0-3.45		SPT 1 @3-3.45 m 2,3,3 N=6		
4	-4		▽									
5	-5					Sand: Dark grey / brown grey, fine to coarse grained sub-anglar to sub-rounded sand, trace fines, (beach sand)		BH5-4.5-4.95		SPT 2 @ 4.5-4.95m 10,14,21 N=35		
6	-6							BH5-6.0-6.45		SPT 3 @ 6-6.45m 9,18,40 N=R		
7	-7											
8	-8					Silty CLAY: Dark grey, high plasticity, firm to stiff, with shell fragments, hydrocarbon odour.		BH5-7.5-7.95		SPT 4 @ 7.5-7.95m 2,3,4 N=7		
9	-9					Silty CLAY: Grey/black/dark grey/green grey, firm to stiff, hydrocarbon odour		BH5-9.0-9.45		SPT 5 @ 9-9.45m 3,3,3 N=6		
10	-10											
11	-11					Sandy CLAY: Mottled pale grey, yellow/green grey (stain), high plasticity clay, fine to medium grained sub-angular to sub-rounded sand, strong hydrocarbon odour, stiff to very stiff, moist.		BH5-10.5-10.95		SPT 6 @ 10.5-10.95m 5,6,9 N=15		
12	-12					Clayey Sand: Pale grey, fine to coarse grained, sub-angular to sub-rounded sand, medium plasticity clay.		BH5-12-12.45		SPT 7 @ 12-12.45m 4,6,14 N=20		
13	-13											

Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith
Machine Type:	Truck mounted rig	**Operators Licence No.:**	

Refer to Standard Sheets for details of abbreviations

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH05

Sheet: 1/1

X-Coord:	329868.672	GDA 94 MGA 56	**Date Commenced:**	23/01/2018	**Logged by:** EM
Y-Coord:	6243646.94		**Date Completed:**	23/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.791 m AHD		**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
14	-14					Sandy CLAY: Grey to green/grey with yellow streaks, high plasticity, fine to medium grained sub-angular to sub-rounded sand, very slight hydrocarbon odour		BH5-13.5-13.95		SPT 8 @ 13.5-13.95m 7,12,16 N=28		
15	-15							BH5-15-15.45		SPT 9 @ 15-15.45m 4,5,6 N=11		
16	-16											
17	-17					Sandy CLAY: Pale grey, high plasticity, fine to medium grained sub-angular to sub-rounded sand, odourless.		BH5-16.5-16.95		SPT 10 @ 16.5-16.95m 10,4,2 N=6		
18	-18					Silty CLAY: Pale grey, high plasticity.		BH5-18-18.45		SPT 11 @ 18-18.45m 5,5,5 N=10		
19	-19											
20	-20					Silty CLAY: Red brown, high plasticity, with fine to medium to coarse grained sub-angular to sub-rounded sand, stiff.		BH5-19.5-19.95		SPT 12 @ 19.5-19.95m 4,5,5 N=10		
21	-21					Silty CLAY: Pale grey, high plasticity, very stiff, moist.		BH5-21-21.45		SPT 13 @ 21-21.45m 6,7,9 N=16		
22	-22											
23	-23					Clayey Sand: Pale grey, fine to coarse grained sub-angular to sub-rounded sand, high plasticity clay, very dense / compact.		BH5-22.5-22.95		SPT 14 @ 22.5-22.95m 21,30,40 N=70 HB		
24	-24									SPT 15 @ 24-24.07m 18/70mm HB		
25	-25					Silty CLAY: Mottled brown and pale grey, high plasticity, very stiff.		BH5-25.5-25.65		SPT 16 @ 25.5-25.65m 16, 18/50mm HB		
26	-26					Terminated at 25.65m						

Drill Company:	Hagstrom Drilling	**Operator Name:**	Shane Smith	Refer to Standard Sheets for details of abbreviations
Machine Type:	Truck mounted rig	**Operators Licence No.:**		

Project ID:	CES130608-BP
Client:	Boyd Properties Pty Lt
Project:	Lot 10 Detailed Site Investigation
Location:	19 Marsh Street, Arncliffe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: HA04

Sheet: 1/1

X-Coord:	329925.162	GDA 94 MGA 56	**Date Commenced:**	22/01/2018	**Logged by:** EM
Y-Coord:	6243672.896		**Date Completed:**	22/01/2018	**Checked by:** IW
Surface Elevation (R.L) :	1.41 m AHD		**Hole Diameter (mm):**	200	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	0	HA				Topsoil: Silty sand, dark brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity, organics and roots, trace shells, loose, dry.						0
						Silty SAND: Brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity, with shell fragments, trace rootlets, loose, dry.		HA4-0.45-0.5				
						Sand: Pale brown, medium to coarse grained, sub-angular to sub-rounded sand, loose, dry.						
						Sand: At 0.68m becoming yellow brown. Shell fragments observed.						
1	-1		▽			Sand: At 1m wet, becoming dark brown.		HA4-1.0-1.1				1
						Sand: At 1.19m becoming pale brown.						
						Clayey Sand: Dark grey/brown, fine to medium grained sub-angular to sub-rounded sand, low plasticity clay, marine odour.		HA4-1.4-1.5				
						Terminated at 1.5m (borehole collapse)						

Drill Company:	Hagstrom Drilling	**Operator Name:**	Refer to Standard Sheets for details of abbreviations
Machine Type:		**Operators Licence No.:**	

Appendix C
Laboratory Certificates of Analysis

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

CERTIFICATE OF ANALYSIS 183677

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	17 Soil
Date samples received	22/01/2018
Date completed instructions received	22/01/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	30/01/2018
Date of Issue	29/01/2018

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

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Paul Ching

Results Approved By
Dragana Tomas, Senior Chemist
Leon Ow, Chemist
Paul Ching, Senior Analyst
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		183677-3	183677-13	183677-15	183677-16
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1	TS	TB
Date Sampled		22/01/2018	22/01/2018	22/01/2018	22/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	23/01/2018	23/01/2018	23/01/2018	23/01/2018
Date analysed	-	24/01/2018	24/01/2018	24/01/2018	24/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	[NA]	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	[NA]	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	[NA]	<25
Benzene	mg/kg	<0.2	<0.2	98%	<0.2
Toluene	mg/kg	<0.5	<0.5	99%	<0.5
Ethylbenzene	mg/kg	<1	<1	98%	<1
m+p-xylene	mg/kg	<2	<2	100%	<2
o-Xylene	mg/kg	<1	<1	100%	<1
naphthalene	mg/kg	<1	<1	[NA]	<1
Total +ve Xylenes	mg/kg	<1	<1	[NT]	<1
Surrogate aaa-Trifluorotoluene	%	107	107	111	123

svTRH (C10-C40) in Soil			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date extracted	-	23/01/2018	23/01/2018
Date analysed	-	24/01/2018	24/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50
Surrogate o-Terphenyl	%	92	89

PAHs in Soil			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date extracted	-	23/01/2018	23/01/2018
Date analysed	-	23/01/2018	23/01/2018
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	121	121

Organochlorine Pesticides in soil			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date extracted	-	23/01/2018	23/01/2018
Date analysed	-	23/01/2018	23/01/2018
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	126	119

Organophosphorus Pesticides			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date extracted	-	23/01/2018	23/01/2018
Date analysed	-	23/01/2018	23/01/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Surrogate TCMX	%	126	119

PCBs in Soil			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date extracted	-	23/01/2018	23/01/2018
Date analysed	-	23/01/2018	23/01/2018
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	126	119

Acid Extractable metals in soil			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date prepared	-	23/01/2018	23/01/2018
Date analysed	-	23/01/2018	23/01/2018
Arsenic	mg/kg	7	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	11	4
Copper	mg/kg	3	2
Lead	mg/kg	5	3
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	4	4
Zinc	mg/kg	10	36

Moisture			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date prepared	-	23/01/2018	23/01/2018
Date analysed	-	24/01/2018	24/01/2018
Moisture	%	33	24

Asbestos ID - soils			
Our Reference		183677-3	183677-13
Your Reference	UNITS	BH01-3.0	HA4-1.0-1.1
Date Sampled		22/01/2018	22/01/2018
Type of sample		Soil	Soil
Date analysed	-	29/01/2018	29/01/2018
Sample mass tested	g	Approx. 30g	Approx. 85g
Sample Description	-	Brown fine-grained soil	Beige sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected

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

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			24/01/2018	[NT]	[NT]	[NT]	[NT]	24/01/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	110	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	110	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	96	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	111	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	115	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	115	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	124	[NT]	[NT]	[NT]	[NT]	126	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	116	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	110	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	116	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	110	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	89	[NT]	[NT]	[NT]	[NT]	96	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	90	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	115	[NT]	[NT]	[NT]	[NT]	131	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	113	[NT]	[NT]	[NT]	[NT]	122	[NT]

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	84	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	82	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate TCMX	%		Org-008	113	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date extracted	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	113	[NT]	[NT]	[NT]	[NT]	107	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Date analysed	-			23/01/2018	[NT]	[NT]	[NT]	[NT]	23/01/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	108	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 183677-3 & 13 were sub-sampled from jars provided by the client.

CHAIN OF CUSTODY - Client

19771

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES
Contact Person: ERIN MILLAR
Project Mgr: M. CHALLONER
Sampler: E. MILLAR
Address: PYMBLE

Phone: **Mob:** 0439261637
Fax: erin.millar@consultingearth.com.au
Email: mark.challoner@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required:

Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply

Lab comments:

Sample information / Tests Required / Comments

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	COMBO 64	HOLD.													Provide as much information about the sample as you can
1	BH01 - 1.0	1.0	22/01	SOIL		X													
2	BH01 - 2.0	2.0		" "		X													
3	BH01 - 3.0	3.0			X														
4	BH01 - 4.0	4.0				X													
5	BH01 - 5.0	5.0				X													
6	BH01 - 6.0	6.0				X													
7	BH01 - 7.0	7.0				X													
8	BH01 - 8.0	8.0				X													
9	HA1 - 0.22 - 0.23	0.22				X													
10	HA2 - 0.20 - 0.21	0.20				X													
11	HA3 - 0.06 - 0.065	0.06				X													
12	HA4 - 0.45 - 0.5	0.45				X													
13	HA4 - 1.0 - 1.1	1.0			X														

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

Job No: 183677
Date Received: 22.1.18
Time Received: 17:40
Received by: JE
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (company): CES
Print Name: ERIN MILLAR
Date & Time: 22.01.18
Signature:

Received by (company): IELS
Print Name: JE
Date & Time: 22.01.18 17:40
Signature:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: 18.8° (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

CHAIN OF CUSTODY - Client

19772

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES
Contact Person: ERIN MILLAR
Project Mgr: M. CHALLONER
Sampler: E. MILLAR / T. WONG
Address: PYMBLE

Phone: **Mob:** 0439 261 637
Fax:
Email: ~~erin.millar@consultingearth.com.au~~ mark.challoner@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required:

Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply

Lab comments:

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	COMBO 6A	TRH	HOLD												Provide as much information about the sample as you can
14	HA4 - 1.4 - 1.5	1.4-1.5	22.01	SOIL			X												
15, 16	TS / TB	—	22.01	SOIL		X													
Extra 17 J.E	BH04 - 1.0																		

Relinquished by (company): CES
Print Name: ERIN MILLAR
Date & Time: 22.01.18
Signature:

Received by (company): ELS
Print Name: JE
Date & Time: 22.1.18
Signature:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: 18.8°C **(if applicable)**
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

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

CERTIFICATE OF ANALYSIS 183801

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	13 Soil
Date samples received	23/01/2018
Date completed instructions received	29/01/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	05/02/2018
Date of Issue	05/02/2018

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

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lulu Scott

Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Lulu Scott, Asbestos Supervisor
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018	31/01/2018	31/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	34	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	34	<25	<25
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
Total +ve Xylenes	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	102	116	111	100

svTRH (C10-C40) in Soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50
Surrogate o-Terphenyl	%	82	81	83	82

PAHs in Soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	31/01/2018	31/01/2018	31/01/2018	31/01/2018
Date analysed	-	31/01/2018	31/01/2018	31/01/2018	31/01/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	112	113	113	111

Organochlorine Pesticides in soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	98	100	98

Organophosphorus Pesticides					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	98	98	100	98

PCBs in Soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	02/02/2018	02/02/2018	02/02/2018	02/02/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	98	98	100	98

Acid Extractable metals in soil					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Arsenic	mg/kg	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	5	3	3
Copper	mg/kg	<1	2	4	<1
Lead	mg/kg	3	5	3	2
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	<1	<1	1
Zinc	mg/kg	2	<1	<1	2

Moisture					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018	31/01/2018	31/01/2018
Moisture	%	19	15	12	18

Asbestos ID - soils					
Our Reference		183801-1	183801-7	183801-9	183801-12
Your Reference	UNITS	BH05 3.0-3.45	BH05 12.0-12.45	BH05 15.0-15.45	BLIND REPLICATE
Date Sampled		23/01/2018	23/01/2018	23/01/2018	23/01/2018
Type of sample		Soil	Soil	Soil	Soil
Date analysed	-	01/02/2018	01/02/2018	01/02/2018	01/02/2018
Sample mass tested	g	Approx. 45g	Approx. 35g	Approx. 40g	Approx. 35g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

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

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			31/01/2018	[NT]	[NT]	[NT]	[NT]	31/01/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	92	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	72	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	88	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	101	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	117	[NT]	[NT]	[NT]	[NT]	118	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-6	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	121	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	121	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	111	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	108	[NT]
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	[NT]	[NT]	92	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			31/01/2018	[NT]	[NT]	[NT]	[NT]	31/01/2018	[NT]
Date analysed	-			31/01/2018	[NT]	[NT]	[NT]	[NT]	31/01/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	121	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	86	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	112	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			02/02/2018	[NT]	[NT]	[NT]	[NT]	02/02/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	129	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	135	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	131	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	133	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	130	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	102	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			02/02/2018	[NT]	[NT]	[NT]	[NT]	02/02/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	116	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Surrogate TCMX	%		Org-008	102	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			02/02/2018	[NT]	[NT]	[NT]	[NT]	02/02/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	102	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	[NT]	[NT]	107	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	[NT]	[NT]	96	[NT]
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 183801-1, 7, 9, 12 were sub-sampled from jars provided by the client.

Simon Song

From: Erin Millar <erin.millar@consultingearth.com.au>
Sent: Monday, 29 January 2018 6:25 PM
To: Simon Song
Subject: CES130608-BP - Analysis

Hi Simon,

Apologies for the delayed instructions. Could I please have the following samples tested for the Combo 6A suite.

Report 183801:
- BH5-15.00-15.45 9
- BH5-12-12.45 7
- BH5-3.0-3.45 1
- BLIND REPLICATE 12

ES Ref: 183801
5dy TAT
Due: 050218.

Report 183905:
- ~~BH05-22.5-22.95~~
- ~~BH5-19.5-19.95~~

Report 184000:
- BH2-16.5-16.95
- BH2-22.5-22.58
- BH03-0.5
- BH4-1.0
- BH4-5-5.45
- BH2-4.5-4.95
- BH2-7.5-7.9
- BH2-10.5-10.95

If you require any further information, please do not hesitate to contact me.

Kind Regards,

Erin Millar
Environmental Scientist

CONSULTING
EARTH
SCIENTISTS

www.consultingearth.com.au

Suite 3, Level 1
55, Grandview Street
Pymble, NSW, 2073
Tel: +61 2 8569 2200 Fax: +61 2 9983 0582 M: +61 439 261 637
ABN 67 151 524 757

CHAIN OF CUSTODY - Client

19773

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES
Contact Person: ERIN MILLAR
Project Mgr: M. CHALLONER
Sampler: E. MILLAR
Address: PYMBLE

Phone: **Mob:** 0439 261 677
Fax: erinmiller@consultingearth.com.au
Email: mark.challoner@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required:
Or choose: standard / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Lab comments:

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Tests Required: HOLD														Comments
1	BH05 - 3.00 - 3.45		23.01	Soil	X														Provide as much information about the sample as you can
2	BH5 - 4.50 - 4.95				X														
3	BH5 - 6.00 - 6.45				X														
4	BH5 - 7.50 - 7.95				X														
5	BH5 - 9.00 - 9.45				X														
6	BH5 - 10.50 - 10.95				X														
7	BH5 - 12.00 - 12.45				X														
8	BH5 - 13.50 - 13.95				X														
9	BH5 - 15.00 - 15.45				X														
10	BH5 - 16.50 - 16.95				X														
11	BH5 - 18.00 - 18.45				X														
12	BLIND REPLICATE				X														
13	SPLIT REPLICATE				X														

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

Job No: 188801
Date Received: 23/1/2018
Time Received: 17.30
Received by: R
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None 11-1

Relinquished by (company): CES
Print Name: ERIN MILLAR
Date & Time: 23.01.2018
Signature:

Received by (company): ELS
Print Name: P.Ray
Date & Time: 23/1/2018 17.30
Signature: R

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: **(if applicable)**
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

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

CERTIFICATE OF ANALYSIS 183905

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	7 Soil
Date samples received	24/01/2018
Date completed instructions received	24/01/2018

Analysis Details

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

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

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

Report Details

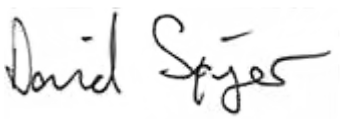
Date results requested by	01/02/2018
Date of Issue	01/02/2018

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

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

Results Approved By
Nick Sarlamis, Inorganics Supervisor

Authorised By



David Springer, General Manager

sPOCAS + %S w/w		
Our Reference		183905-7
Your Reference	UNITS	BH02
Depth		1.5
Date Sampled		23/01/2018
Type of sample		Soil
Date prepared	-	25/01/2018
Date analysed	-	25/01/2018
pH $_{kcl}$	pH units	7.2
TAA pH 6.5	moles H^+ /t	<5
s-TAA pH 6.5	%w/w S	<0.01
pH $_{Ox}$	pH units	3.2
TPA pH 6.5	moles H^+ /t	120
s-TPA pH 6.5	%w/w S	0.20
TSA pH 6.5	moles H^+ /t	120
s-TSA pH 6.5	%w/w S	0.20
ANC_E	% $CaCO_3$	<0.05
a-ANC_E	moles H^+ /t	<5
s-ANC_E	%w/w S	<0.05
S_{KCl}	%w/w S	0.04
S_P	%w/w	0.40
S_{POS}	%w/w	0.36
a-S_{POS}	moles H^+ /t	230
Ca_{KCl}	%w/w	0.10
Ca_P	%w/w	0.14
Ca_A	%w/w	0.038
Mg_{KCl}	%w/w	0.073
Mg_P	%w/w	0.086
Mg_A	%w/w	0.013
S_{HCl}	%w/w S	<0.005
S_{NAS}	%w/w S	<0.005
a-S_{NAS}	moles H^+ /t	<5
s-S_{NAS}	%w/w S	<0.01
Fineness Factor	-	1.5
a-Net Acidity	moles H^+ /t	160
s-Net Acidity	%w/w S	0.25
Liming rate	kg $CaCO_3$ /t	12
s-Net Acidity without -ANCE	%w/w S	0.25
a-Net Acidity without ANCE	moles H^+ /t	160
Liming rate without ANCE	kg $CaCO_3$ /t	12

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			25/01/2018	[NT]	[NT]	[NT]	[NT]	25/01/2018	[NT]
Date analysed	-			25/01/2018	[NT]	[NT]	[NT]	[NT]	25/01/2018	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	91	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	115	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
TPA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	90	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TSA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-ANC_E	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{POS}	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

19774

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES	**Client Project Name / Number / Site etc (ie report title):** CES130608-BP
Contact Person: ERIN MILLAR	**PO No.:**
Project Mgr: MARK CHALLONER	**Envirolab Quote No. :**
Sampler: ERIN MILLAR / IVAN WONG	**Date results required:**
Address: PYMBLE	**Or choose:** standard / same day / 1 day / 2 day / 3 day
	Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Phone: **Mob:** 0403273626	**Lab comments:**
Fax:	
Email: erin.millar@consultingearth.com.au; mark.challoner@consultingearth.com.au	

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Hold	SpocAs													Provide as much information about the sample as you can
JAR	BH02 -1.0	1	23.01.18	Soil	X														
	BH02 -2.0	2	23.01.18		X														
	BH05 -19.5-19.95	3	24.01.18		X														
	BH05 - 21 -21.45	4			X														
	BH05 - 22.5 -22.955	5			X														
	BH05-25.5-25.95	6			X														
BAG	BH02 - 1.5	7	23.01.18			X													

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

Job No: 183905
Date Received: 24/1/2018
Time Received: 17.55
Received by: PR
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None
18.1

Relinquished by (company): CES	**Received by (company):** EA	***Lab use only:***
Print Name: IVAN WONG	**Print Name:** P.Ray	**Samples Received: Cool or Ambient (circle one)**
Date & Time: 24.01.18	**Date & Time:** 24/1/2018 1755	**Temperature Received at: (if applicable)**
Signature:	**Signature:**	**Transported by: Hand delivered / courier**

White - Lab copy / Blue - Client copy / Pink - Retain in Book

Simon Song

From: Erin Millar <erin.millar@consultingearth.com.au>
Sent: Monday, 29 January 2018 6:25 PM
To: Simon Song
Subject: CES130608-BP - Analysis

Hi Simon,

Apologies for the delayed instructions. Could I please have the following samples tested for the Combo 6A suite.

Report 183801:

- BH5-15.00-15.45
- BH5-12-12.45
- BH5-3.0-3.45
- BLIND REPLICATE

Report 183905: – A

5 • BH05-22.5-22.95
3 • BH5-19.5-19.95

Report 184000:

- BH2-16.5-16.95
- BH2-22.5-22.58
- BH03-0.5
- BH4-1.0
- BH4-5-5.45
- BH2-4.5-4.95
- BH2-7.5-7.9
- BH2-10.5-10.95

ELS: 183905-A
Rec. 29/1/18
TAT: 5 days

If you require any further information, please do not hesitate to contact me.

Kind Regards,

Erin Millar
Environmental Scientist

CONSULTING EARTH SCIENTISTS

www.consultingearth.com.au

Suite 3, Level 1
55, Grandview Street
Pymble, NSW, 2073
Tel: +61 2 8569 2200 Fax: +61 2 9983 0582 M: +61 439 261 637
ABN 67 151 524 757

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

CERTIFICATE OF ANALYSIS 183905-A

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	7 Soil
Date samples received	24/01/2018
Date completed instructions received	29/01/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	05/02/2018
Date of Issue	01/02/2018

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

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Paul Ching

Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Paul Ching, Senior Analyst
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH & BTEXN in Soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018
TRH C_6 - C_9	mg/kg	<25	72
TRH C_6 - C_{10}	mg/kg	<25	240
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	220
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	1
m+p-xylene	mg/kg	<2	11
o-Xylene	mg/kg	<1	4
naphthalene	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	16
Surrogate aaa-Trifluorotoluene	%	91	89

svTRH (C10-C40) in Soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	180
TRH C_{15} - C_{28}	mg/kg	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	94
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	94
TRH >C_{16} -C_{34}	mg/kg	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	90
Surrogate o-Terphenyl	%	76	76

PAHs in Soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018
Naphthalene	mg/kg	<0.1	0.4
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	0.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	104	104

Organochlorine Pesticides in soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018
HCB	mg/kg	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1
Surrogate TCMX	%	91	91

Organophosphorus Pesticides			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1
Surrogate TCMX	%	91	91

PCBs in Soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date extracted	-	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018
Aroclor 1016	mg/kg	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1
Surrogate TCLMX	%	91	91

Acid Extractable metals in soil			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date prepared	-	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018
Arsenic	mg/kg	73	<4
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	13	2
Copper	mg/kg	<1	<1
Lead	mg/kg	6	<1
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	<1	<1
Zinc	mg/kg	3	<1

Moisture			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date prepared	-	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018
Moisture	%	16	11

Asbestos ID - soils			
Our Reference		183905-A-3	183905-A-5
Your Reference	UNITS	BH05	BH05
Depth		19.5-19.95	22.5-22.95
Date Sampled		24/01/2018	24/01/2018
Type of sample		Soil	Soil
Date analysed	-	01/02/2018	01/02/2018
Sample mass tested	g	Approx. 40g	Approx. 25g
Sample Description	-	Red coarse-grained soil	Beige coarse-grained soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibre detected
Trace Analysis	-	No asbestos detected	No asbestos detected

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

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

QUALITY CONTROL: vTRH & BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			31/01/2018	[NT]	[NT]	[NT]	[NT]	31/01/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	87	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	[NT]	[NT]	[NT]	[NT]	87	[NT]
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	[NT]	[NT]	82	[NT]
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	82	[NT]
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	90	[NT]
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	92	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	109	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	106	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	92	[NT]
Surrogate o-Terphenyl	%		Org-003	79	[NT]	[NT]	[NT]	[NT]	86	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	121	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	104	[NT]	[NT]	[NT]	[NT]	100	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	94	[NT]	[NT]	[NT]	[NT]	111	[NT]

QUALITY CONTROL: Organophosphorus Pesticides					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	81	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	85	[NT]
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	80	[NT]
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Surrogate TCMX	%		Org-008	94	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	[NT]
Date extracted	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Date analysed	-			30/01/2018	[NT]	[NT]	[NT]	[NT]	30/01/2018	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCLMX	%		Org-006	94	[NT]	[NT]	[NT]	[NT]	91	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-20	[NT]
Date prepared	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	[NT]
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	[NT]
Arsenic	mg/kg	4	Metals-020	<4	3	73	87	18	93	[NT]
Cadmium	mg/kg	0.4	Metals-020	<0.4	3	<0.4	<0.4	0	101	[NT]
Chromium	mg/kg	1	Metals-020	<1	3	13	14	7	101	[NT]
Copper	mg/kg	1	Metals-020	<1	3	<1	<1	0	98	[NT]
Lead	mg/kg	1	Metals-020	<1	3	6	7	15	96	[NT]
Mercury	mg/kg	0.1	Metals-021	<0.1	3	<0.1	<0.1	0	104	[NT]
Nickel	mg/kg	1	Metals-020	<1	3	<1	1	0	97	[NT]
Zinc	mg/kg	1	Metals-020	<1	3	3	2	40	97	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying
40-50g of sample in its own container.
Note: Samples 183905-A-3 & 5 were sub-sampled from jars provided by the client.

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

CERTIFICATE OF ANALYSIS 184000

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	21 Soil
Date samples received	25/01/2018
Date completed instructions received	25/01/2018

Analysis Details

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

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

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

Report Details

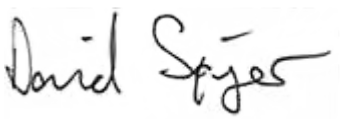
Date results requested by	02/02/2018
Date of Issue	01/02/2018

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

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

Results Approved By
Nick Sarlamis, Inorganics Supervisor

Authorised By



David Springer, General Manager

sPOCAS + %S w/w		
Our Reference		184000-2
Your Reference	UNITS	BH2
Depth		3.25-3.45
Type of sample		Soil
Date prepared	-	25/01/2018
Date analysed	-	25/01/2018
pH $_{kcl}$	pH units	6.7
TAA pH 6.5	moles H^+ /t	<5
s-TAA pH 6.5	%w/w S	<0.01
pH $_{Ox}$	pH units	2.5
TPA pH 6.5	moles H^+ /t	190
s-TPA pH 6.5	%w/w S	0.31
TSA pH 6.5	moles H^+ /t	190
s-TSA pH 6.5	%w/w S	0.31
ANC_E	% $CaCO_3$	<0.05
a-ANC_E	moles H^+ /t	<5
s-ANC_E	%w/w S	<0.05
S_{KCl}	%w/w S	0.02
S_P	%w/w	0.37
S_{POS}	%w/w	0.35
a-S_{POS}	moles H^+ /t	220
Ca_{KCl}	%w/w	0.02
Ca_P	%w/w	0.03
Ca_A	%w/w	<0.005
Mg_{KCl}	%w/w	0.026
Mg_P	%w/w	0.039
Mg_A	%w/w	0.012
S_{HCl}	%w/w S	<0.005
S_{NAS}	%w/w S	<0.005
a-S_{NAS}	moles H^+ /t	<5
s-S_{NAS}	%w/w S	<0.01
Fineness Factor	-	1.5
a-Net Acidity	moles H^+ /t	200
s-Net Acidity	%w/w S	0.32
Liming rate	kg $CaCO_3$ /t	15
s-Net Acidity without -ANCE	%w/w S	0.32
a-Net Acidity without ANCE	moles H^+ /t	200
Liming rate without ANCE	kg $CaCO_3$ /t	15

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			25/01/2018	[NT]	[NT]	[NT]	[NT]	25/01/2018	[NT]
Date analysed	-			25/01/2018	[NT]	[NT]	[NT]	[NT]	25/01/2018	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	91	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	115	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	101	[NT]
TPA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	90	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TSA pH 6.5	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-ANC_E	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{POS}	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

CHAIN OF CUSTODY - Client

19775

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES

Contact Person: ERIN MILLAR

Project Mgr: MARK CHALLONER

Sampler: IVAN WONG

Address: 55 GRANDVIEW ST, PYMBLE

Phone: **Mob:** 0403273626

Fax: erin.millar@consultingearth.com.au

Email: mark.challoner@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608 - BP

PO No.:

Envirolab Quote No. :

Date results required:

Or choose: standard / same day / 1 day / 2 day / 3 day

Note: Inform lab in advance if urgent turnaround is required - surcharges apply

Lab comments:

Sample information					Tests Required														Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	HOLD	SPOCAS													Provide as much information about the sample as you can
Bag	BH2-3-3.25	1	25/01/18	Soil	X														
"	BH2-3.25-3.45	2				X													
Jar	BH2-4.5-4.95	3			X														
	BH2-6-6.27	4			X														
	BH2 7.5-7.9	5			X														
	BH2 9-9.45	6			X														
	BH2-10.5-10.95	7			X														
	BH2-12-12.45	8			X														
	BH2-13.5-13.95	9			X														
	BH2-15-15.45	10			X														
Bag	BH2-16.5-16.95	11		soil	X														
	BH2-18-18.45	12			X														
	BH2-19.5-19.95	13			X														

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

Job No: 184000

Date Received: 25/1/18

Time Received: 18:30

Received by: AB

Temp: Cool/Ambient

Cooling: Ice/Icepack

Security: Intact/Broken/None

Relinquished by (company): CES

Print Name: IVAN WONG

Date & Time: 25.01.18

Signature:

Received by (company): ELS / ~~ANS~~

Print Name: AB

Date & Time: 25/1/18 18:30

Signature:

Lab use only:

Samples Received: Cool or Ambient (circle one)

Temperature Received at: (if applicable)

Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

CHAIN OF CUSTODY - Client

19776

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES
Contact Person: ERIN MILLAR
Project Mgr: MARK CHALLONER
Sampler: IVAN WONG
Address: 55 GRANDVIEW ST, PYMBLE
Phone: **Mob:** 0403273626
Fax: erin.millar@consultingearth.com.au
Email: mark.challoner@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required:
Or choose: ~~standard~~ / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Lab comments:

	Sample information				Tests Required												Comments
	Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample												Provide as much information about the sample as you can
14	Bag	BH2-21-21.35		25/01/18	Soil												
15		BH2-22.5-22.58															
16		BH3-0.5															
17		BH4-1.0															
18		BH4-2.0															
19		BH4-3.00-3.45															
20		BH4-4.00-4.45															
21		~~BH4~~ BH4-5-5.45															

Relinquished by (company): CES
Print Name: IVAN WONG
Date & Time: 25/01/18
Signature:

Received by (company): ELS 184000
Print Name: AB
Date & Time: 25/1/18 18:30
Signature:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: (if applicable)
Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

Simon Song

From: Erin Millar <erin.millar@consultingearth.com.au>
Sent: Monday, 29 January 2018 6:25 PM
To: Simon Song
Subject: CES130608-BP - Analysis

Hi Simon,

Apologies for the delayed instructions. Could I please have the following samples tested for the Combo 6A suite.

Report 183801:

- BH5-15.00-15.45
- BH5-12-12.45
- BH5-3.0-3.45
- BLIND REPLICATE

Report 183905:

- BH05-22.5-22.95
- BH5-19.5-19.95

Report 184000: – A

11 - BH2-16.5-16.95
15 - BH2-22.5-22.58
16 - BH03-0.5
17 - BH4-1.0
21 - BH4-5-5.45
3 - BH2-4.5-4.95
5 - BH2-7.5-7.9
7 - BH2-10.5-10.95

ELS: 184000-A
Rec: 29/1/18
TAT: 5 days

If you require any further information, please do not hesitate to contact me.

Kind Regards,

Erin Millar
Environmental Scientist

CONSULTING
EARTH
SCIENTISTS

www.consultingearth.com.au

Suite 3, Level 1
55, Grandview Street
Pymble, NSW, 2073
Tel: +61 2 8569 2200 Fax: +61 2 9983 0582 M: +61 439 261 637
ABN 67 151 524 757

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

CERTIFICATE OF ANALYSIS 184000-A

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	21 Soil
Date samples received	25/01/2018
Date completed instructions received	29/01/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	05/02/2018
Date of Issue	01/02/2018

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

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

Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lulu Scott

Results Approved By
Dragana Tomas, Senior Chemist
Long Pham, Team Leader, Metals
Lulu Scott, Asbestos Supervisor
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	31/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	01/02/2018	31/01/2018	31/01/2018	31/01/2018	31/01/2018
TRH C_6 - C_9	mg/kg	37	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	120	<25	<25	43	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	120	<25	<25	43	<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	3	<2	<2	<2	<2
o-Xylene	mg/kg	1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	4	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	78	81	89	109

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018	31/01/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	76	88	82

svTRH (C10-C40) in Soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	31/01/2018	31/01/2018	31/01/2018
TRH C_{10} - C_{14}	mg/kg	89	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	77	75	75	70	71

svTRH (C10-C40) in Soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	31/01/2018	31/01/2018	31/01/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50
Surrogate o-Terphenyl	%	75	74	68

PAHs in Soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Naphthalene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	0.3	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	122	105	105	94	97

PAHs in Soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1
Pyrene	mg/kg	0.2	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.1	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1
Total +ve PAH's	mg/kg	1.0	<0.05	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	102	103	100

Organochlorine Pesticides in soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	91	92	90	84

Organochlorine Pesticides in soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	91	109	88

Organophosphorus Pesticides						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	93	91	92	90	84

Organophosphorus Pesticides				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	91	109	88

PCBs in Soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	93	91	92	90	84

PCBs in Soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date extracted	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	91	109	88

Acid Extractable metals in soil						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Arsenic	mg/kg	<4	<4	<4	10	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	5	2	1	13	12
Copper	mg/kg	<1	<1	<1	3	8
Lead	mg/kg	3	<1	1	6	64
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	<1	<1	<1	1	<1
Zinc	mg/kg	<1	1	<1	13	<1

Acid Extractable metals in soil				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
Arsenic	mg/kg	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	3	2	3
Copper	mg/kg	9	4	<1
Lead	mg/kg	16	5	<1
Mercury	mg/kg	0.2	<0.1	<0.1
Nickel	mg/kg	3	1	1
Zinc	mg/kg	41	23	<1

Moisture						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018	30/01/2018	30/01/2018
Moisture	%	23	15	12	8.9	14

Moisture				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date prepared	-	30/01/2018	30/01/2018	30/01/2018
Date analysed	-	30/01/2018	30/01/2018	30/01/2018
Moisture	%	14	16	18

Asbestos ID - soils						
Our Reference		184000-A-3	184000-A-5	184000-A-7	184000-A-11	184000-A-15
Your Reference	UNITS	BH2	BH2	BH2	BH2	BH2
Depth		4.5-4.95	7.5-7.9	10.5-10.95	16.5-16.95	22.5-22.58
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	01/02/2018	01/02/2018	01/02/2018	01/02/2018	01/02/2018
Sample mass tested	g	Approx. 40g	Approx. 60g	Approx. 55g	Approx. 40g	Approx. 45g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil	Brown sandy soil	Beige sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		184000-A-16	184000-A-17	184000-A-21
Your Reference	UNITS	BH3	BH4	BH4
Depth		0.5	1	5-5.45
Type of sample		Soil	Soil	Soil
Date analysed	-	01/02/2018	01/02/2018	01/02/2018
Sample mass tested	g	Approx. 55g	Approx. 45g	Approx. 40g
Sample Description	-	Brown sandy soil	Brown sandy soil	Brown sandy soil
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

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

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	31/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			31/01/2018	3	01/02/2018	31/01/2018		31/01/2018	31/01/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	3	37	<25	39	87	77
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	3	120	88	31	87	77
Benzene	mg/kg	0.2	Org-016	<0.2	3	<0.2	<0.2	0	82	73
Toluene	mg/kg	0.5	Org-016	<0.5	3	<0.5	<0.5	0	89	75
Ethylbenzene	mg/kg	1	Org-016	<1	3	<1	<1	0	82	71
m+p-xylene	mg/kg	2	Org-016	<2	3	3	2	40	90	82
o-Xylene	mg/kg	1	Org-016	<1	3	1	<1	0	86	79
naphthalene	mg/kg	1	Org-014	<1	3	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	92	3	106	79	29	84	77

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	31/01/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	3	89	110	21	109	101
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	3	<100	<100	0	106	97
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	3	<100	<100	0	92	92
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	3	<50	56	11	109	101
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	3	<100	<100	0	106	97
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	3	<100	<100	0	92	92
Surrogate o-Terphenyl	%		Org-003	79	3	77	77	0	86	75

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	3	0.3	0.2	40	92	82
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	96	88
Phenanthrene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	103	91
Anthracene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	98	86
Pyrene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	121	106
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	95	89
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	3	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	3	<0.05	<0.05	0	98	88
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	104	3	122	104	16	100	99

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
HCB	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	93	90
gamma-BHC	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	102	98
Heptachlor	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	100	97
delta-BHC	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	100	97
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	101	98
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	103	100
Dieldrin	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	102	99
Endrin	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	102	98
pp-DDD	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	108	105
Endosulfan II	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	107	101
Methoxychlor	mg/kg	0.1	Org-005	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	94	3	93	97	4	111	110

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	81	81
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	85	83
Dimethoate	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	93	97
Fenitrothion	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	86	84
Malathion	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	80	74
Parathion	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	91	86
Ronnel	mg/kg	0.1	Org-008	<0.1	3	<0.1	<0.1	0	91	90
Surrogate TCMX	%		Org-008	94	3	93	97	4	91	92

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date extracted	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	102	100
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	3	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	94	3	93	97	4	91	92

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-4	184000-A-5
Date prepared	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Date analysed	-			30/01/2018	3	30/01/2018	30/01/2018		30/01/2018	30/01/2018
Arsenic	mg/kg	4	Metals-020	<4	3	<4	<4	0	110	96
Cadmium	mg/kg	0.4	Metals-020	<0.4	3	<0.4	<0.4	0	98	102
Chromium	mg/kg	1	Metals-020	<1	3	5	5	0	105	101
Copper	mg/kg	1	Metals-020	<1	3	<1	<1	0	111	102
Lead	mg/kg	1	Metals-020	<1	3	3	2	40	104	98
Mercury	mg/kg	0.1	Metals-021	<0.1	3	<0.1	<0.1	0	104	104
Nickel	mg/kg	1	Metals-020	<1	3	<1	1	0	107	98
Zinc	mg/kg	1	Metals-020	<1	3	<1	<1	0	98	99

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying
40-50g of sample in its own container.
Note: Samples 184000-A-3, 5, 7, 11, 15 to 17, 21 were sub-sampled from jars provided by the client.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1803139**	Page	: 1 of 7
Client	: **CONSULTING EARTH SCIENTISTS**	Laboratory	: Environmental Division Sydney
Contact	: MARK CHALLONER	Contact	: Customer Services ES
Address	: Suite 3, Level 1 55-65 Grandview Street PYMBLE NSW, AUSTRALIA 2073	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8569 2200	Telephone	: +61-2-8784 8555
Project	: CES130608-BP	Date Samples Received	: 25-Jan-2018 18:30
Order number	: ----	Date Analysis Commenced	: 30-Jan-2018
C-O-C number	: ----	Issue Date	: 05-Feb-2018 15:35
Sampler	: ERIN MILLAR		
Site	: ----		
Quote number	: SYBQ/521/16		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

General Comments

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

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

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

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

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

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

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

- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SPLIT REPLICATE	----	----	----	----
			Client sampling date / time	23-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1803139-001	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**24.8**	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	----	----	----	----
Asbestos Type	1332-21-4	-	--	**-**	----	----	----	----
Sample weight (dry)	----	0.01	g	**35.9**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	----	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**4**	----	----	----	----
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----
Lead	7439-92-1	5	mg/kg	<5	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg	<5	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPLIT REPLICATE	----	----	----	----
				Client sampling date / time	23-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1803139-001	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPLIT REPLICATE	----	----	----	----
				Client sampling date / time	23-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1803139-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SPLIT REPLICATE	----	----	----	----
				Client sampling date / time	23-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1803139-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**128**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		**122**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		**71.4**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**81.0**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**84.6**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**77.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**81.4**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**81.7**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**98.1**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**86.5**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**80.9**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**83.7**	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	SPLIT REPLICATE - 23-Jan-2018 00:00	Mid grey sandy soil.

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

CHAIN OF CUSTODY - Client

19773

ENVIROLAB GROUP - National Phone number 1300 42 43 44

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph 03 9763 2500 / melbourne@envirolab.com.au

Brisbane Lab - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph 07 3266 9532 / brisbane@envirolab.com.au

Adelaide Lab - Envirolab Services
7 Palmerton Road Windsor Gardens, SA 5087
Ph 0406 350 706 / adelaide@envirolab.com.au

Client: CES	Client Project Name / Number / Site etc (ie report title): CES130608-BP
Contact Person: ERIN HILLAR	
Project Mgr: M. CHALLONER	PO No.:
Sampler: E.MILLAR	Envirolab Quote No. :
Address: PYMBLE	Date results required:
	Or choose: standard / same day / 1 day / 2 day / 3 day (standard circled)
Phone: Mob: 0439 761 677	*Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Fax: erinmillar@consultingearth.com.au	Lab comments:
Email: mark.challoner@consultingearth.com.au	

Sample information / Tests Required / Comments

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Hold	Tests Required	Comments (Provide as much information about the sample as you can)
1	BH05 - 2.00-2.45		23.01	SOIL	X	Asbestos / Newcastle	
2	BH5 - 4.50 - 4.95						
3	BH5 - 6.00 - 6.45						
4	BH5 - 7.50 - 7.95						
5	BH5 - 9.00 - 9.45						
6	BH5 - 10.50 - 10.95						
7	BH5 - 12.00 - 12.45						
8	BH5 - 13.50 - 13.95						
9	BH5 - 15.00 - 15.45						
10	BH5 - 16.50 - 16.95						
11	BH5 - 18.00 - 18.45						
12	BLIND REPLICATE						
13	SPLIT REPLICATE	(1)	↓	↓		Combo 6A TRH / BTEX / PAH / OC / OP / PCB / 8M / Asbestos	ALS

Stamp: Subcon / Forward Lab / Split WO — Asbestos / Newcastle
Lab / Analysis:
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No:
Attach By PO / Internal Sheet:

Environmental Division
Sydney
Work Order Reference
ES1803139
Telephone : +61-2-8784 8555

Envirolab Services, 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200
Job No: 188801
Date Received: 23/1/2018
Time Received: 17.30
Received By: R
Temp: Cool/Ambient
Cooling: Ice/Icepack 11.1
Security: Intact/Broken/None

Relinquished by (company): CES	ELS	Received by (company): ELS	Lab use only:
Print Name: ERIN MILLAR	JACK EMBLEN	Print Name: P.Ray	Samples Received: Cool or Ambient (circle one)
Date & Time: 23.01.2018	25.1.18 12:30	Date & Time: 23/1/2018 1730	Temperature Received at: (if applicable)
Signature: [signature]	[signature]	Signature: R	Transported by: Hand delivered / courier

White - Lab copy / Blue - Client copy / Pink - Retain in Book

Page No:

Rec: [signature] 25/1/18 1830 15.2C

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

CERTIFICATE OF ANALYSIS 186281

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	1 Water
Date samples received	01/03/2018
Date completed instructions received	07/03/2018

Analysis Details

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

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

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

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

Report Details

Date results requested by	09/03/2018
Date of Issue	09/03/2018

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

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

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Water		
Our Reference		186281-1
Your Reference	UNITS	BH5
Date Sampled		01/03/2018
Type of sample		Water
Date extracted	-	02/03/2018
Date analysed	-	02/03/2018
TRH C_6 - C_9	µg/L	<10
TRH C_6 - C_{10}	µg/L	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	2
m+p-xylene	µg/L	3
o-xylene	µg/L	1
Naphthalene	µg/L	<1
Surrogate Dibromofluoromethane	%	101
Surrogate toluene-d8	%	97
Surrogate 4-BFB	%	97

svTRH (C10-C40) in Water		
Our Reference	UNITS	186281-1
Your Reference		BH5
Date Sampled		01/03/2018
Type of sample		Water
Date extracted	-	07/03/2018
Date analysed	-	07/03/2018
TRH C_{10} - C_{14}	µg/L	74
TRH C_{15} - C_{28}	µg/L	<100
TRH C_{29} - C_{36}	µg/L	<100
TRH >C_{10} - C_{16}	µg/L	53
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	53
TRH >C_{16} - C_{34}	µg/L	<100
TRH >C_{34} - C_{40}	µg/L	<100
Surrogate o-Terphenyl	%	88

PAHs in Water		
Our Reference	UNITS	186281-1
Your Reference		BH5
Date Sampled		01/03/2018
Type of sample		Water
Date extracted	-	08/03/2018
Date analysed	-	08/03/2018
Naphthalene	µg/L	<1
Acenaphthylene	µg/L	<1
Acenaphthene	µg/L	<1
Fluorene	µg/L	<1
Phenanthrene	µg/L	<1
Anthracene	µg/L	<1
Fluoranthene	µg/L	<1
Pyrene	µg/L	<1
Benzo(a)anthracene	µg/L	<1
Chrysene	µg/L	<1
Benzo(b,j+k)fluoranthene	µg/L	<2
Benzo(a)pyrene	µg/L	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1
Dibenzo(a,h)anthracene	µg/L	<1
Benzo(g,h,i)perylene	µg/L	<1
Benzo(a)pyrene TEQ	µg/L	<5
Total +ve PAH's	µg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	106

OCP in water		
Our Reference	UNITS	186281-1
Your Reference		BH5
Date Sampled		01/03/2018
Type of sample		Water
Date extracted	-	08/03/2018
Date analysed	-	08/03/2018
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	%	99

OP Pesticides in water		
Our Reference	UNITS	186281-1
Your Reference		BH5
Date Sampled		01/03/2018
Type of sample		Water
Date extracted	-	08/03/2018
Date analysed	-	08/03/2018
Azinphos-methyl (Guthion)	µg/L	<0.2
Bromophos ethyl	µg/L	<0.2
Chlorpyriphos	µg/L	<0.2
Chlorpyriphos-methyl	µg/L	<0.2
Diazinon	µg/L	<0.2
Dichlorovos	µg/L	<0.2
Dimethoate	µg/L	<0.2
Ethion	µg/L	<0.2
Fenitrothion	µg/L	<0.2
Malathion	µg/L	<0.2
Parathion	µg/L	<0.2
Ronnel	µg/L	<0.2
Surrogate TCMX	%	99

HM in water - dissolved		
Our Reference	UNITS	186281-1
Your Reference		BH5
Date Sampled		01/03/2018
Type of sample		Water
Date prepared	-	08/03/2018
Date analysed	-	08/03/2018
Arsenic-Dissolved	µg/L	2
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	13
Zinc-Dissolved	µg/L	1

Miscellaneous Inorganics		
Our Reference		186281-1
Your Reference	UNITS	BH5
Date Sampled		01/03/2018
Type of sample		Water
Date prepared	-	07/03/2018
Date analysed	-	07/03/2018
Total Nitrogen in water	mg/L	14
NOx as N in water	mg/L	<0.005
Ammonia as N in water	mg/L	11
Phosphate as P in water	mg/L	0.062

Metals in Waters - Total		
Our Reference		186281-1
Your Reference	UNITS	BH5
Date Sampled		01/03/2018
Type of sample		Water
Date prepared	-	08/03/2018
Date analysed	-	08/03/2018
Phosphorus - Total	mg/L	0.5

Method ID	Methodology Summary
Inorg-055	Nitrate - determined colourimetrically. Soils are analysed following a water extraction.
Inorg-055/062	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Soils are analysed following a water extraction.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			02/03/2018	1	02/03/2018	02/03/2018		02/03/2018	[NT]
Date analysed	-			02/03/2018	1	02/03/2018	02/03/2018		02/03/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	1	<10	<10	0	106	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	1	<10	<10	0	106	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	103	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	105	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	2	2	0	107	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	3	3	0	107	[NT]
o-xylene	µg/L	1	Org-016	<1	1	1	1	0	107	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	102	1	101	102	1	101	[NT]
Surrogate toluene-d8	%		Org-016	97	1	97	97	0	102	[NT]
Surrogate 4-BFB	%		Org-016	96	1	97	96	1	101	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			07/03/2018	[NT]	[NT]	[NT]	[NT]	07/03/2018	[NT]
Date analysed	-			07/03/2018	[NT]	[NT]	[NT]	[NT]	07/03/2018	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	112	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	93	[NT]
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	[NT]	[NT]	105	[NT]

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Date analysed	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Naphthalene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Acenaphthylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	120	[NT]
Phenanthrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	118	[NT]
Pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	125	[NT]
Benzo(a)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	124	[NT]
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	84	[NT]	[NT]	[NT]	[NT]	94	[NT]

QUALITY CONTROL: OCP in water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Date analysed	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
HCB	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
gamma-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	94	[NT]
Heptachlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	96	[NT]
delta-BHC	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	93	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	97	[NT]
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	102	[NT]
Dieldrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	109	[NT]
Endrin	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	98	[NT]
pp-DDD	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	106	[NT]
Endosulfan II	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	105	[NT]
Methoxychlor	µg/L	0.2	Org-005	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-005	81	[NT]	[NT]	[NT]	[NT]	90	[NT]

QUALITY CONTROL: OP Pesticides in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Date analysed	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	105	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dichlorovos	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	75	[NT]
Dimethoate	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	100	[NT]
Fenitrothion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	106	[NT]
Malathion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	99	[NT]
Parathion	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	108	[NT]
Ronnel	µg/L	0.2	Org-008	<0.2	[NT]	[NT]	[NT]	[NT]	116	[NT]
Surrogate TCMX	%		Org-008	81	[NT]	[NT]	[NT]	[NT]	84	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Date analysed	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			07/03/2018	[NT]	[NT]	[NT]	[NT]	07/03/2018	[NT]
Date analysed	-			07/03/2018	[NT]	[NT]	[NT]	[NT]	07/03/2018	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062	<0.1	[NT]	[NT]	[NT]	[NT]	92	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	99	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	[NT]	[NT]	99	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: Metals in Waters - Total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Date analysed	-			08/03/2018	[NT]	[NT]	[NT]	[NT]	08/03/2018	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	[NT]	[NT]	[NT]	[NT]	104	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Dissolved Metals: no filtered, preserved sample was received, therefore
the unpreserved sample was filtered through 0.45 µm filter at the lab.
Note: there is a possibility some elements may be underestimated.

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph: 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph: 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph: 08 7087 6800 / adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 7, 17 Willes Rd, Berrimah, NT 0820
Ph: 08 8967 1201 / darwin@envirolab.com.au

Client: Consulting Earth Scientists
Contact Person: Erin Millar
Project Mgr: Mark Challoner
Sampler: Erin Millar
Address:
Level 1, Suite 3
55-65 Grandview Street, Pymble NSW 2073
Phone: (02)85 692 200 **Mob:** 0439 261 637
Email: erin.millar@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required:
Or choose: **standard** / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges
Additional report format: esdat / equis /
Lab Comments:

Sample information					Tests Required													Comments
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	Nutrients	TPH	BTEX	OCP	OPP	dissolved 8 metals	PAH	HOLD						Provide as much information about the sample as you can
	~~BH1~~		~~1-Mar~~	~~Water~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~							
	~~BH2~~		~~1-Mar~~	~~Water~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~							
6	BH5	-	1-Mar	Water	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	~~x~~	X						
	~~QAQC1~~		~~1-Mar~~	~~Water~~	x	x	x	x	x	x	x							
	~~QAQC2~~		~~1-Mar~~	~~Water~~	~~Please forward to ALS for all analytes above~~													
	~~TB/TS~~		1-Mar	Water		x	x											

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

Job No: 180281
Date Received: 1/3/2018
Time Received: 14:30
Received By: PL
Temp: Cool/Ambient 1-6
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (Company): CES	**Received by (Company):** ELS	***Lab Use Only***	
Print Name: Erin Millar	**Print Name:** P. Ray	**Job number:**	**Cooling:** Ice / Ice pack / None
Date & Time: 1/3/18	**Date & Time:** 1/3/2018 14:30	**Temperature:**	**Security seal:** Intact / Broken / None
Signature: Erin Millar	**Signature:**	**TAT Req - SAME day / 1 / 2 / 3 / 4 / STD**	

Simon Song

From: Erin Millar <erin.millar@consultingearth.com.au>
Sent: Wednesday, 7 March 2018 9:40 AM
To: Aileen Hie
Cc: Simon Song
Subject: RE: Sample Receipt for 186281 CES130608-BP

Hi Aileen / Simon,

This one appears to have slipped past me! Can I have this sample tested for the following:

- Nutrients
- TRH /BTEX
- OCP
- OPP
- Dissolved 8 heavy metals
- PAH

If you require any further information, please do not hesitate to contact me.

Kind Regards,

Erin Millar
Environmental Scientist

CONSULTING
EARTH
SCIENTISTS

www.consultingearth.com.au

Suite 3, Level 1
55, Grandview Street
Pymble, NSW, 2073
Tel: +61 2 8569 2200 Fax: +61 2 9983 0582 M: +61 439 261 637
ABN 67 151 524 757

From: Aileen Hie [mailto:AHie@envirolab.com.au]
Sent: Thursday, 1 March 2018 6:07 PM
To: erin.millar@consultingearth.com.au
Subject: Sample Receipt for 186281 CES130608-BP

Please refer to attached for:
a copy of our Sample Receipt Advice (SRA)
Please open and read the SRA as it contains important information.
Please let the lab know immediately if there are any issues.

ENVIROLAB GROUP | ENVIROLAB SERVICES | mpl

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph: 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph: 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph: 08 7087 6800 / adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 7, 17 Willes Rd, Berrimah, NT 0820
Ph: 08 8967 1201 / darwin@envirolab.com.au

Client: CES	Client Project Name / Number / Site etc (ie report title): CES130608-BP
Contact Person: E. Millar	PO No.:
Project Mgr: Mark Challoner	Envirolab Quote No. :
Sampler: S. Inameti	Date results required: STD
Address:	Or choose: standard / same day / 1 day / 2 day / 3 day *Note: Inform lab in advance if urgent turnaround is required - surcharges apply*
Phone: 413601751 Mob:	Additional report format: esdat / equis /
Email: tristan.goodbody@consultingearth.com.au mark.challoner@consultingearth.com.au erin.millar@consultingearth.com.au samuel.inameti@consultingearth.com.au	Lab Comments:

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	8 Dissolved HM	Nutrients	TRH/BTEX	PAH	OCP	OPP	Provide as much information about the sample as you can
1	BH01	-	01-03-18	Water	X	X	X	X	X	X	
2	BH2	-	01-03-18	Water	X	X	X	X	X	X	
3	QAQC1	-	"	"	X	X	X	X	X	X	
-	QAQC2	-	"	"	→	→	→	→	→	→	Send to ACS
4	TS										
5	TB										

Extra J.E.

Envirolab Services, 12 Ashley St, Chatswood NSW 2067, Ph: (02) 9910 6200
Job No: 186375
Date Received: 02.03.18
Time Received: 15:00
Received by: JE
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Relinquished by (Company): CES	Received by (Company): ELS		*Lab use only:*
Print Name: S. Inameti	Print Name: JE		Samples Received: Cool or Ambient (circle one)
Date & Time: 01-03-18	Date & Time: 02.03.18 15:00		Temperature Received at: 16.1°C (if applicable)
Signature:	Signature:		Transported by: Hand delivered / courier

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

CERTIFICATE OF ANALYSIS 186375

Client Details

Client	Consulting Earth Scientists Pty Ltd
Attention	Mark Challoner, Tristan Goodbody, Samuel Inameti, Erin Millar
Address	Suite 3, Level 1, 55 Grandview Street, Pymble, NSW, 2073

Sample Details

Your Reference	**CES130608-BP**
Number of Samples	3 Water
Date samples received	02/03/2018
Date completed instructions received	02/03/2018

Analysis Details

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

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

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

Report Details

Date results requested by	09/03/2018
Date of Issue	09/03/2018

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

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

Results Approved By
Diego Bigolin, Team Leader, Inorganics
Dragana Tomas, Senior Chemist
Jaimie Loa-Kum-Cheung, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Leon Ow, Chemist
Steven Luong, Senior Chemist

Authorised By

David Springer, General Manager

vTRH(C6-C10)/BTEXN in Water				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date extracted	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	05/03/2018
TRH C_6 - C_9	µg/L	<10	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10	<10
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	100	99	99
Surrogate toluene-d8	%	98	97	96
Surrogate 4-BFB	%	94	96	98

svTRH (C10-C40) in Water				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date extracted	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	06/03/2018
TRH C_{10} - C_{14}	µg/L	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	75	81	86

PAHs in Water				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date extracted	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	05/03/2018
Naphthalene	µg/L	<1	<1	<1
Acenaphthylene	µg/L	<1	<1	<1
Acenaphthene	µg/L	<1	<1	<1
Fluorene	µg/L	<1	<1	<1
Phenanthrene	µg/L	<1	<1	<1
Anthracene	µg/L	<1	<1	<1
Fluoranthene	µg/L	<1	<1	<1
Pyrene	µg/L	<1	<1	<1
Benzo(a)anthracene	µg/L	<1	<1	<1
Chrysene	µg/L	<1	<1	<1
Benzo(b,j+k)fluoranthene	µg/L	<2	<2	<2
Benzo(a)pyrene	µg/L	<1	<1	<1
Indeno(1,2,3-c,d)pyrene	µg/L	<1	<1	<1
Dibenzo(a,h)anthracene	µg/L	<1	<1	<1
Benzo(g,h,i)perylene	µg/L	<1	<1	<1
Benzo(a)pyrene TEQ	µg/L	<5	<5	<5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	106	112	112

OCP in water				
Our Reference	UNITS	186375-1	186375-2	186375-3
Your Reference		BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date extracted	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	05/03/2018
HCB	µg/L	<0.2	<0.2	<0.2
alpha-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	70	73	77

OP Pesticides in water				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date extracted	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	05/03/2018
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Dichlorovos	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	70	73	77

HM in water - dissolved				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date prepared	-	05/03/2018	05/03/2018	05/03/2018
Date analysed	-	05/03/2018	05/03/2018	05/03/2018
Arsenic-Dissolved	µg/L	6	5	5
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	7	7
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	2	2	2
Zinc-Dissolved	µg/L	6	4	7

Miscellaneous Inorganics				
Our Reference	UNITS	186375-1	186375-2	186375-3
Your Reference		BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date prepared	-	02/03/2018	02/03/2018	02/03/2018
Date analysed	-	02/03/2018	02/03/2018	02/03/2018
Total Nitrogen in water	mg/L	9.1	18	18
NOx as N in water	mg/L	0.05	0.3	0.3
Ammonia as N in water	mg/L	5.2	12	11
Phosphate as P in water	mg/L	0.10	0.23	0.21

Metals in Waters - Total				
Our Reference		186375-1	186375-2	186375-3
Your Reference	UNITS	BH01	BH2	QAQC1
Date Sampled		01/03/2018	01/03/2018	01/03/2018
Type of sample		Water	Water	Water
Date prepared	-	06/03/2018	06/03/2018	06/03/2018
Date analysed	-	07/03/2018	07/03/2018	07/03/2018
Phosphorus - Total	mg/L	0.4	1.2	1.3

Method ID	Methodology Summary
Inorg-055	Nitrate - determined colourimetrically. Soils are analysed following a water extraction.
Inorg-055/062	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Soils are analysed following a water extraction.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-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-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	[NT]
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	1	<10	<10	0	118	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	1	<10	<10	0	118	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	114	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	119	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	119	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	119	[NT]
o-xylene	µg/L	1	Org-016	<1	1	<1	<1	0	120	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	102	1	100	100	0	103	[NT]
Surrogate toluene-d8	%		Org-016	96	1	98	97	1	100	[NT]
Surrogate 4-BFB	%		Org-016	95	1	94	97	3	99	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	186375-2
Date extracted	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	1	<50	<50	0	110	107
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	1	<100	<100	0	111	121
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	1	<100	<100	0	86	107
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	1	<50	<50	0	110	107
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	1	<100	<100	0	111	121
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	1	<100	<100	0	86	107
Surrogate o-Terphenyl	%		Org-003	80	1	75	66	13	93	81

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	186375-2
Date extracted	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Naphthalene	µg/L	1	Org-012	<1	1	<1	<1	0	96	70
Acenaphthylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Acenaphthene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluorene	µg/L	1	Org-012	<1	1	<1	<1	0	105	82
Phenanthrene	µg/L	1	Org-012	<1	1	<1	<1	0	105	81
Anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Fluoranthene	µg/L	1	Org-012	<1	1	<1	<1	0	114	101
Pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	120	109
Benzo(a)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Chrysene	µg/L	1	Org-012	<1	1	<1	<1	0	109	88
Benzo(b,j+k)fluoranthene	µg/L	2	Org-012	<2	1	<2	<2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	125	97
Indeno(1,2,3-c,d)pyrene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	1	Org-012	<1	1	<1	<1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	130	1	106	96	10	98	126

QUALITY CONTROL: OCP in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	186375-2
Date extracted	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
HCB	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	108	85
gamma-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	111	111
Heptachlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	110	110
delta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	108	112
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	120	124
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	129	123
Dieldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	128	131
Endrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	123	118
pp-DDD	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	128	122
Endosulfan II	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	121	74
Methoxychlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	70	1	70	71	1	77	86

QUALITY CONTROL: OP Pesticides in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	186375-3
Date extracted	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Azinphos-methyl (Guthion)	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	91	92
Chlorpyriphos-methyl	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Dichlorovos	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	96	102
Dimethoate	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	100	111
Fenitrothion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	111	88
Malathion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	112	85
Parathion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	106	95
Ronnel	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	101	99
Surrogate TCMX	%		Org-008	70	1	70	71	1	73	74

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	186375-2
Date prepared	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Date analysed	-			05/03/2018	1	05/03/2018	05/03/2018		05/03/2018	05/03/2018
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	6	[NT]		100	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	[NT]		103	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		96	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		95	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		104	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	100	92
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	6	[NT]		99	[NT]

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			02/03/2018	[NT]	[NT]	[NT]	[NT]	02/03/2018	[NT]
Date analysed	-			02/03/2018	[NT]	[NT]	[NT]	[NT]	02/03/2018	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	[NT]	[NT]	[NT]	[NT]	101	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	[NT]	[NT]	[NT]	[NT]	101	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	[NT]	[NT]	[NT]	[NT]	108	[NT]

QUALITY CONTROL: Metals in Waters - Total						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			06/03/2018	1	06/03/2018	06/03/2018		06/03/2018	[NT]
Date analysed	-			07/03/2018	1	07/03/2018	07/03/2018		07/03/2018	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	0.4	0.4	0	106	[NT]

Result Definitions

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

Quality Control Definitions

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1806787**	Page	: 1 of 7
Client	: **CONSULTING EARTH SCIENTISTS**	Laboratory	: Environmental Division Sydney
Contact	: MARK CHALLONER	Contact	: Customer Services ES
Address	: Suite 3, Level 1 55-65 Grandview Street PYMBLE NSW, AUSTRALIA 2073	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8569 2200	Telephone	: +61-2-8784 8555
Project	: CES130608-BP	Date Samples Received	: 05-Mar-2018 14:10
Order number	: ----	Date Analysis Commenced	: 05-Mar-2018
C-O-C number	: ----	Issue Date	: 12-Mar-2018 15:28
Sampler	: SAM INAMETI		
Site	: ----		
Quote number	: SYBQ/521/16		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

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

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

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

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

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

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

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

- EK059G: result for sample 1 reported from natural bottle (refer run 2424003)
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QAQC2	----	----	----	----
				Client sampling date / time	01-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1806787-001	--------	--------	--------	--------
					Result	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		**0.005**	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.006**	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**11.7**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.26**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.07**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.33**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**17.8**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ **Total Nitrogen as N**	----	0.1	mg/L		**18.1**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.51**	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	----	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QAQC2	----	----	----	----
				Client sampling date / time	01-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1806787-001	--------	--------	--------	--------
					Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	----	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	----	----	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	----	----	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L		<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L		<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.5	µg/L		<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QAQC2	----	----	----	----
				Client sampling date / time	01-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1806787-001	--------	--------	--------	--------
					Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	----	----	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	----	----	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	----	----	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	----	----	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	----	----	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	----	----	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	----	----	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	----	----	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	----	----	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	----	----	----	----
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	µg/L		<0.5	----	----	----	----
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	µg/L		<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	----	----	----	----
EP080: BTEXN									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	QAQC2	----	----	----	----
				Client sampling date / time	01-Mar-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1806787-001	--------	--------	--------	--------
					Result	----	----	----	----
EP080: BTEXN - Continued									
Benzene	71-43-2	1	µg/L		<1	----	----	----	----
Toluene	108-88-3	2	µg/L		<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	----	----	----	----
^ **Total Xylenes**	----	2	µg/L		<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L		<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		**108**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**96.4**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		**20.8**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		**57.3**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%		**80.5**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		**85.5**	----	----	----	----
Anthracene-d10	1719-06-8	1.0	%		**86.2**	----	----	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		**94.9**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**129**	----	----	----	----
Toluene-D8	2037-26-5	2	%		**104**	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		**110**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 424 344

Sydney Lab - Envirolab Services
12 Ashley St, Chatswood, NSW 2067
Ph: 02 9910 6200 / sydney@envirolab.com.au

Perth Lab - MPL Laboratories
16-18 Hayden Crt Myaree, WA 6154
Ph: 08 9317 2505 / lab@mpl.com.au

Melbourne Lab - Envirolab Services
1A Dalmore Drive Scoresby VIC 3179
Ph: 03 9763 2500 / melbourne@envirolab.com.au

Adelaide Office - Envirolab Services
7a The Parade, Norwood, SA 5067
Ph: 08 7087 6800 / adelaide@envirolab.com.au

Brisbane Office - Envirolab Services
20a, 10-20 Depot St, Banyo, QLD 4014
Ph: 07 3266 9532 / brisbane@envirolab.com.au

Darwin Office - Envirolab Services
Unit 7, 17 Willes Rd, Berrimah, NT 0820
Ph: 08 8967 1201 / darwin@envirolab.com.au

Client: CES
Contact Person: E. Millar
Project Mgr: Mark Challoner
Sampler: S. Inameti
Address:
Phone: 413601751 Mob:
Email:
tristan.goodbody@consultingearth.com.au
mark.challoner@consultingearth.com.au erin.millar@consultingearth.com.au
samuel.inameti@consultingearth.com.au

Client Project Name / Number / Site etc (ie report title): CES130608-BP
PO No.:
Envirolab Quote No. :
Date results required: STD
Or choose: (standard) / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Additional report format: esdat / equis /
Lab Comments:

Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	8 Dissolved HM	Nutrients	TRH/BTEX	PAH	OCP	OPP	Comments: Provide as much information about the sample as you can
1	BH01	-	01-03-18	Water	X	X	X	X	X	X	
2	BH2	-	01-03-18	Water	X	X	X	X	X	X	
3	QAQC1	-	11	11	X	X	X	X	X	X	
- (1)	QAQC2	-	11	11	→						send to ALS
4	TS										
5	TB										

Extra J.E.

Envirolab Services, Chatswood NSW 2067, Ph: (02) 9910 6200
Job No: 186375
Date Received: 02.03.18
Time Received: 15:00
Received by: JE
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Environmental Division Sydney
Work Order Reference
ES1806787
Telephone : +61-2-8784 8555

Relinquished by (Company): CES — 2ML
Print Name: S. Inameti — Vani
Date & Time: 02-03-18 — 5/3/18
Signature:

Received by (Company): ELS
Print Name: JE
Date & Time: 02.03.18 15:00
Signature:

Lab use only:
Samples Received: Cool or Ambient (circle one)
Temperature Received at: 16.1°C (if applicable)
Transported by: Hand delivered / courier

Rec: Scott... 5/3/18 1410 10.5

Appendix D
Acid Sulfate Soil Screening Results

Appendix D: ASS Field Screening Results

Sample Location	Depth (m)	Soil Description	pH_f	pH_{fox}	Effervesence	Odour	Colour change	pH change	PASS?	Submitted to laboratory
BH01	0.5	Gravelly sand, pale brown, F-M	8.33	5.82	XX	N	N	2.51	N	N
BH01	1.0	Gravelly sand, pale brown, F-M	6.97	5.81	XX	N	N	1.16	N	N
BH01	1.5	Gravelly sand, pale brown, F-M, shell fragments, wet	6.13	2.48	XXX	N	N	3.65	Y	Y
BH01	2.0	Gravelly sand, pale brown, F-M, shell fragments, wet	5.72	3.66	XX	N	N	2.06	N	N
BH01	2.5	Silty sand, dark brown, F-M	6.60	5.30	XXX	N	N	1.3	N	N
BH01	3.0	Silty sand, dark brown, F-M	7.15	4.27	XXX	N	N	2.88	N	N
BH02	0.5	Silty sand, brown, wet	5.91	5.60	N/A	N	N	0.31	N	N
BH02	1.0	Gravelly, silty sand, red/brown, wet	5.76	5.46	X	N	N	0.30	N	N
BH02	1.5	Silty clay, dark grey	6.11	2.93	XXX	N	rk grey to pale brov	3.18	Y	Y
BH02	2.0	Silty clay, dark grey	5.71	4.09	XXX	N	rk grey to pale brov	1.62	N	N
BH02	3.0	Clayey sand, dark grey	6.40	5.36	XX	N	N	1.04	N	N
BH02	3.25	Clayey sand, dark grey	6.56	0.81	XXX	N	N	5.75	Y	N
BH03	0.5	Silty sand, brown, shell fragments.	7.31	6.70	XX	N	N	0.61	N	N
BH04	0.5	Gravelly sand, pale brown, F-M, wet	6.22	5.65	X	N	N	0.57	N	N
BH04	1.0	Clay, pale grey/brown, high plasticity	7.08	5.62	X	N	N	1.46	N	N

Appendix E
Field Data Sheets

CONSULTING EARTH SCIENTISTS

GROUNDWATER FIELD DATA SHEET

Client:	**Boyd Properties Pty Ltd**	**CES Project Code:**	**CES130608-BP**
Project:	**19 Marsh St_DESA**	**Location:**	**19 Marsh St, Arncliffe**
Sampler (s): EM	**Signature(s):** EM	**Project Manager:**	**M. Challoner**
BH ID: BH01		**Sample ID:** BH01	
Purging Date: 20/2/18		**Sampling Date:** 1/3/18	

Well Status

Well damaged:	YES/NO	Well locked:	YES/NO
Cement footing damaged:	YES/NO	Cap on PVC casing:	YES/NO
Internal obstructions in casing:	YES/NO	Well ID visible:	YES/NO
Standing water, vegetation around monument:	YES/NO	Monument damaged:	YES/NO
Water between PVC and protective casing:	YES/NO	Odours from groundwater	YES/NO
Comments:	YES/NO		

TOC: 0.07m bgl.

4.30

1.33	Standing Water Level (SWL):	1.26	(mBTOC)	Weather Conditions	
	Well volume:	12	(L)	Temperature:	°C
	Water level after purging: ~~1.95~~	1.71	(mBTOC)	Clear / Partly Cloudy / Overcast	
	Water level at time of sampling: ~~1.95~~	1.35	(mBTOC)	- total depth (1/3/18) 2.92 mbtoc	
	Volume of water purged:	60	(L)	Calm / Slight breeze / Moderate Breeze	
	Purging equipment:		Pump / micro-Purging / Bailer / ~~Foot Valve~~	Windy	
	Sampling equipment:		Pump / Bailer	Fine / Showers / Rain	

Purging Details

Elapsed time (min)	Cumulative volume (L)	DO ($mg.L^{-1}$)	EC ($\mu S.cm^{-1}$)	pH -	Eh mV	Temp. (°C)	Comments
–	–	0.09	7.22	6.72	-99	24.5	Dark grey, very turbid, Organic odour.

Groundwater field parameters at the end of purging to be marked "Field Measurements".

At time of development
Dk grey, turbid, organic odour

At time of sampling: approx. 200ml water able to be collected - well silted up 1.38m since development

CONSULTING EARTH SCIENTISTS

GROUNDWATER FIELD DATA SHEET

Client:	**Boyd Properties Pty Ltd**	**CES Project Code:**	**CES130608-BP**
Project:	**19 Marsh St _DESA**	**Location:**	**19 Marsh St, Arncliffe**
Sampler (s): EM	**Signature(s):** EM	**Project Manager:**	**M. Challoner**
BH ID:	BH02	**Sample ID:**	BH2 / QAQC1 / QAQC2
Purging Date:	20/2/18	**Sampling Date:**	1/3/18

Well Status

Well damaged:	YES/NO	Well locked:	YES/NO
Cement footing damaged:	YES/NO	Cap on PVC casing:	YES/NO
Internal obstructions in casing:	YES/NO	Well ID visible:	YES/NO
Standing water, vegetation around monument:	YES/NO	Monument damaged:	~~YES/NO~~ garlic
Water between PVC and protective casing:	YES/NO	Odours from groundwater	YES/NO
Comments:	YES/NO		

5.35 mbtoc

1.72 Standing Water Level (SWL): 1.51 (mBTOC) Weather Conditions ~ 26

Well volume: 15 (L) Temperature: °C

Water level after purging: ~~1.95~~ 2.34 (mBTOC) Clear Partly Cloudy Overcast

Water level at time of sampling: ~~1.95~~ 1.78 (mBTOC)

Volume of water purged: 75 (L) Calm Slight breeze Moderate Breeze

Purging equipment: Pump / micro-Purging / Bailer / ~~Foot Valve~~ Windy

Sampling equipment: Pump / Bailer Fine Showers Rain

Purging Details

Elapsed time (min)	Cumulative volume (L)	DO (mg.L^{-1})	EC (µS.cm^{-1})	pH -	Eh mV	Temp. (°C)	Comments
–	–	0.15	21.03	6.89	-125	25.5	Pale brown, turbid,
							Organic odours

Groundwater field parameters at the end of purging to be marked "Field Measurements".

At time of development
Dk. grey, turbid, s. organic odour

CONSULTING EARTH SCIENTISTS

GROUNDWATER FIELD DATA SHEET

Client:	**Boyd Properties Pty Ltd**	**CES Project Code:**	**CES130608-BP**
Project:	**19 Marsh St _DESA**	**Location:**	**19 Marsh St, Arncliffe**
Sampler (s): EM	**Signature(s):** EM	**Project Manager:**	**M. Challoner**
BH ID:	BH5	**Sample ID:**	~~BH105~~ BH5
Purging Date:	20/2/18	**Sampling Date:**	1/3/18

Well Status

Well damaged:	YES/NO	Well locked:	YES/NO
Cement footing damaged:	YES/NO	Cap on PVC casing:	YES/NO
Internal obstructions in casing:	YES/NO	Well ID visible:	YES/NO
Standing water, vegetation around monument:	YES/NO	Monument damaged:	YES/NO
Water between PVC and protective casing:	YES/NO	Odours from groundwater	YES/NO
Comments:	YES/NO		
	Depth 5.48	Weather Conditions	
Standing Water Level (SWL): 1.74	(mBTOC)	Temperature:	°C
Well volume: 15	(L)		
Water level after purging: ~~1.95~~ 2.03	(mBTOC)	Clear / Partly Cloudy / Overcast	
Water level at time of sampling: ~~1.95~~ 1.68	(mBTOC)		
Volume of water purged: 75	(L)	Calm / Slight breeze / Moderate Breeze	
Purging equipment:	Pump / micro-Purging / Bailer / Foot Valve	Windy	
Sampling equipment:	Pump / Bailer	Fine / Showers / Rain	

Purging Details

Elapsed time (min)	Cumulative volume (L)	DO (mg.L^{-1})	EC (uS.cm^{-1})	pH -	Eh mV	Temp. (°C)	Comments
11:29	-	1.93	3320	6.79	31	25.6	Grey, turbid, organic odour
2	1	0.90	3290	6.78	-18	24.8	" "
4	2	0.80	3240	6.77	-58	24.1	" "
6	3	0.63	3170	6.77	-83	23.8	" "
8	4	0.47	3080	6.77	-107	23.7	" "
10	5	0.43	3020	6.77	-122	23.8	" "
12	6	0.40	2960	6.78	-130	23.6	" " * Sample

Groundwater field parameters at the end of purging to be marked "Field Measurements".

At time of development
Dk, Grey Brown, turbid, organic odour