Report

Contamination Investigation

Dee Why Bowling Club

221-223 Fisher Road North, Dee Why NSW

18 JANUARY 2016

Prepared for
GJW Consultancy Pty Ltd

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Executive Summary

Sullivan Environmental Sciences Pty Ltd (Sullivan-ES) was engaged by GJW Consultancy Pty Ltd (GJW) to undertake a contamination investigation at the property known as the Dee Why Bowling and Recreation Club located at 221-223 Fisher Road North, Dee Why (Cromer) NSW; henceforth referred to as 'the site'. The site is currently used as a lawn bowl sports facility with club house amenities. The site is earmarked for development to subdivide the site, relocate the club house onsite and construct independent-living residential apartments with a single level basement car park in the southern portion of the site.

The objectives of the investigation were to assess and characterise soil and groundwater conditions at the site against the criteria for the proposed land use. The scope of work consisted of conducting a search and review of aerial photographs, registered groundwater bores, NSW EPA contaminated sites register, soil and geological maps, the Warringah Local Environmental Plan 2011 (LEP), and acid sulfate soils maps. A detailed site inspection was undertaken to visually record site conditions and its surrounds, followed by a program of soil and groundwater sampling that consisted of:

- 8 drilled boreholes and soil sampling.
- 4 surface soil samples from soil mounds.
- 1 groundwater well sample located at the down gradient area of the site.
- Chemical analysis of soil and groundwater samples for a suite of chemicals commensurate with potential contamination from current and historical activities.

Based on the findings of this contamination investigation at the site, Sullivan-ES make the following conclusions:

- The site soils are of relatively good quality and meet the land use criteria for the proposed development. As such, the site soils are suitable for the proposed land use for recreational sporting activities and for independent-living residential apartments.
- Asbestos was detected at one location (SP1_0.2m) in the soil mounds located at the southern end of the site. This is considered a localised impact given that asbestos was not detected anywhere else nor was asbestos containing materials visually observed anywhere.
- Asbestos impacted soils in the soil mounds are unsuitable to remain on the site. A preliminary waste classification for the soil mounds is 'Special Waste – Asbestos' and 'General Solid Waste (GSW) for the material to be disposed offsite at a landfill. This classification should be confirmed by supplementary sampling during bulk earthworks prior to offsite removal to a landfill.
- Acid Sulfate Soils (ASS) were confirmed to exist at the site in the natural soils. The chemical results exceed Action Criteria and require an ASS Management Plan to be prepared to document the appropriate management of the ASS during bulk earthworks to construct the car park. The presence and extent of ASS should be confirmed by supplementary sampling during bulk earthworks.
- Natural soils that need to be excavated for the basement cannot be classified as VENM given the presence of ASS.
- Elevated concentrations of nickel and zinc are attributed to the endemic sources in an urbanised environment and the relatively susceptible shallow groundwater. The concentrations of nickel and zinc are relatively low and not significant to warrant further assessment, and unlikely to pose any unacceptable risk to onsite or offsite receptors. However, if the onsite groundwater bore is to be recommissioned, then the bore should be licensed under DPI regulations, and groundwater should be tested to verify the water quality produced by the bore for future use.

Sullivan-ES make the following recommendations:

Executive Summary

- Works required to remove asbestos impacted soil mounds and other bulk earthworks activities should be the subject of a waste management plan (WMP) to be incorporated within construction management plans for the new development. The WMP should include details of sampling for waste classification purposes and management options to reuse, reduce or dispose of the waste materials including asbestos wastes.
- An ASS Management Plan should be prepared and also form part of the construction management plans to address expected ASS during bulk earthworks. Details of further verification sampling should be included in the ASS Management Plan such that appropriate management procedures are included and contingency measures are suitable.

This Executive Summary is subject to the Limitations of the report as stated in Section 8.

1 Introduction

Sullivan Environmental Sciences Pty Ltd (Sullivan-ES) was engaged by GJW Consultancy Pty Ltd (GJW) to undertake a contamination investigation at the property known as the Dee Why Bowling and Recreation Club located at 221-223 Fisher Road North, Dee Why (Cromer) NSW; henceforth referred to as 'the site'. The location of the site is shown on Figure 1 **(Appendix A)**. The general layout of the site is shown on Figure 2 **(Appendix A)**.

The site is currently used as a lawn bowl sports facility with club house amenities. The site is earmarked for development to subdivide the site, relocate the club house and construct independent-living residential apartments with a single level basement car park in the southern portion of the site.

1.1 Objectives

The objectives of the investigation were to assess and characterise soil and groundwater conditions at the site against the criteria for the proposed land use for independent-living residential apartments.

1.2 Scope of Work

The following presents the scope of work conducted for the investigation.

- Reviewing available records and information relevant to the site including:
    - Historical aerial photographs
    - Registered groundwater bores
    - NSW EPA contaminated land registry
    - Environment protection licensing.
- Conducting a detailed site inspection to document current site conditions and surrounding environments.
- Conducting field sampling of soils and groundwater by:
    - Reviewing all Dial-Before-You-Dig service plans and clear/confirm all proposed borehole drilling locations with a certified underground cable locator subcontractor.
    - Using a drilling rig to sample a total of 8 soil boreholes.
    - Using hand tools to collect 4 surface soil samples of the stockpiled/dumped fill materials in the south of the site.
    - Installing and sampling one (1) temporary groundwater well.
    - Dispatching collected soil and water samples to a NATA accredited laboratory.
- Preparation of a contamination investigation report in consideration of the NSW OEH Guidelines for Consultants Reporting on Contaminated Sites, 2011 (the Reporting Guidelines), the State Environmental Planning Policy 55 (the SEPP55), and the National Environment Protection (Assessment of Site Contamination) Measure 2013 (the ASC NEPM 2013).

1.3 Regulatory Framework

The investigation was prepared in accordance with the following regulatory framework and guideline documents:

- Contaminated Land Management Act 1997 (CLM Act).
- State Environmental Planning Policy No.55 – Remediation of Land 1998 (SEPP55).
- NSW OEH Guidelines for Consultants Reporting on Contaminated Sites, 2011 (OEH, 2011).
- National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013).

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Site Information

The following sections were compiled from:

- Information provided by GJW.
- The detailed site inspection undertaken by Sullivan-ES on 23 November 2015.
- Published Australian geology and topographic maps.
- NSW Department of Primary Industries - Water (DPI Water) groundwater database.
- Warringah Local Environmental Plan (LEP) 2011.

2.1 Identification and Land Zone

The site is an irregular shape and is approximately 1.15 hectares (11,500m^2) in area and legally identified as Lot 32 in DP868310. In accordance with the Warringah LEP 2011 (Land Zoning Map), the land use zone of the site is RE2 Private Recreation.

2.2 Site Features

A general site layout is presented on Figure 2 in **Appendix A.**

Site Description

The site comprises three lawn bowling greens, a double-storey club house, maintenance and machinery sheds, and car parking areas. The southern portion of the site (triangular shaped area) appeared not to be used for the lawn bowls activities and consisted of a crushed concrete/brick unsealed surface that is used for overnight parking of coach buses. At the time of the inspection there were three buses occupying this area.

The site surface is sealed by bitumen and concrete in car park areas, driveways and building footprints. The remain surfaces are unsealed and covered by grass, or crushed rock material.

There appeared to be no prominent filling of areas apart from under the eastern most bowling green.

An area of dumped soil material was observed in the bus parking area as shown on Figure 2. The origins of this material were not known.

Dee Why Creek is a watercourse feature that insects the site and flows in a south eastern direction. The creek runs under the site through a large drainage pipe. The eastern most bowling green has been constructed over the creek.

A large sewerage main runs down the length of the western site boundary.

Surrounding Land

The site is bordered by the following land uses:

- **North** – Dumic Place Reserve (open space parkland and riparian corridor).
- **South** – Residential homes (low density).
- **East** – Cromer Park playing fields (open space).
- **West** – Residential homes (low density).

2.3 Environmental Setting

Topography and Drainage

The site is relatively flat and sits at approximately 15m above sea level (AHD – Australian Height Datum). Surface water presumably infiltrates the unsealed surfaces or drains directly into Dee Why Creek.

Geology

The site is located on the geological formation of Quaternary period lithology consisting of silty to peaty quartz sand, silt, and clay. Ferruginous and humic cementation in places. Common shell layers. The sites paleo-environment is documented as stream alluvial and estuarine sediment. (Ref: Sydney 1:100,000 Geological Series Sheet 9130 (edition 1) 1983, NSW Department of Minerals Resources).

Soil Type

The soil landscape map shows that the underlying soils at the site are of the Newport soil landscape group (NSW OEH website – eSPADE). This type of soil group is described by the soil profile report as follows:

- *Physiography: unknown and used for urban. Slope 5% (estimated), aspect north. profile is well drained, erosion hazard is slight, and no salting evident.*
- *Soil Type: Podzol(GSG), Uc2.32(PPF).*
- *Profile Field Notes: Multiple benching downslope, very similato Bondi. Note sand layer directly over bedrock.*

Groundwater

A review of the DPI Water groundwater database showed that there are 21 sites within 500 metres of the site. The 5 closest sites are shown in the table below.

Table 2-1 Registered Groundwater Bores Information

Bore ID	Date Installed	Distance/Direction to site	Depth and SWL[1]	Purpose
GW113580	Dec 2008	Approx. 200m south	No details	Monitoring
GW113579	Dec 2008	Approx. 200m south	No details	Monitoring
GW113575	Apr 2007	Approx. 200m south	No details	Monitoring
GW113567	June 2004	Approx. 200m south	No details	Monitoring
GW113576	Apr 2007	Approx. 200m south	No details	Monitoring

(1) Standing Water Level

Grounds staff onsite confirmed that there exists a groundwater bore onsite on the eastern site boundary. It has not been in use for some time and is not licensed with the DPI as the above records show. The grounds staff stated that the bore was relatively shallow at approximately 10m and was used previously as an irrigation resource.

2 Site Information

Acid Sulfate Soils

In accordance with the Warringah LEP 2011 Acid Sulfate Soils planning map, there is no planning information or works classification that applies to the site.

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Site History

The following was sourced from information provided in:

- Historical aerial photographs
- Google Earth historical imagery
- NSW EPA Contaminated Lands Register and Notifications
- NSW EPA POEO licensing.

3.1 Aerial Photography

The table below presents the details of observations made from each aerial photograph reviewed. Historical aerial imagery is presented in **Appendix D**.

Table 3-1 Historical Aerial Imagery

Year	Details
1943 (black & white)	The majority of the site appears to be undeveloped bushland with cleared walking tracks shown crossing the site. The northern end appears to be used for crop growing (market gardens?). Dee Why Creek is clearly shown running through the site. Surrounding areas are similar with market gardens and residential homes scattered throughout.
1951 (black & white)	The site appears to be used exclusively for market gardens. Only minor areas appear as undeveloped. The creek appears to have been realigned as a straight stormwater drain or encased in a drainage pipe. The surrounding lands are becoming more urbanised with greater density of residential homes. Land to the north and east remains as undeveloped bush, while a large expanse of bush to the northeast has been cleared.
1961 (black & white)	No changes are obvious on the site since 1951. New shed buildings have been constructed in the central portion of the site, possibly to house poultry. Dee Why Creek has been encased as a drainage pipe, while crops are grown over the former creek area. Residential lots adjoining the site along Fisher Road North are being established. Land to the north and east remains as bushland, and to the northeast remains cleared land.
1970 (black & white)	Market garden beds are not apparent in this frame. The land to the north is now being used for crop growing. The poultry(?) sheds remain erect. Density of residential homes has increased significantly. Land to the east is being used for market gardens adjoining the site thereafter it remains as bushland. The cleared northeast land is being used to store large rectangular containers or something similar.

Year	Details
1982 (colour)	The site has been redeveloped as a lawn bowls club. The large sheds have been removed. Two bowling greens are present with the clubhouse as it exists today (central green and eastern green). The north and south ends of the site are grassed vacant areas. Surrounding lands are all residential with no remnant market gardens remaining. Land to the north is vacant scrub land. Land to the east has been cleared/filled and under preparation for what will be future playing fields. Land to the northeast is now a school.
1991 (colour)	The only change to the site is the addition of a new bowling green at the north end of the site (northern green). The central and eastern greens remain as before. Surrounding lands remain unchanged.
2002 (colour)	The eastern green has been relocated approximately 30m south of its original location. A portion of the southern grassed area (at the southern most extremity) seems to be covered by soil or fill material. There are no apparent changes to surrounding lands with urbanisation well established at this time.
2006 - Google Earth image (colour)	The southern area of the site is being used for bus parking. Gravel has been added to the grassed surface in this area. No other changes have occurred onsite. No changes to the surrounding lands.
2014 - Google Earth image (colour)	The majority of the southern area is now covered by gravel and buses are parked in this area. The soil mounds appear on this aerial proximal to the southern boundary. No other changes are apparent in the surrounding lands.

3.2 Contaminated Land Register and Notifications

A review of the NSW EPA list of sites notified under section 58 of the CLM Act 1997 as well as the list of sites notified to the EPA under the duty to report requirements (section 60) showed that the site is not registered as a contaminated site or notified as a potentially contaminated site.

3.3 Environmental Protection Licensing

There is no Environmental Protection Licence (EPL) being operated at the site.

3.4 Contamination Issues

The following operations and activities have been identified as contamination issues from the environmental conditions and historical appraisal:

- Farming/market gardening operations.

3 Site History

- Infilling of creek areas and other earthworks.
- Stockpiling/dumping of fill/soil of unknown origin.
- Acid sulfate soils.

Based on these issues, the following contaminants of concern were assessed in soils:

- Total Petroleum/Recoverable Hydrocarbons (TPH/TRH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- BTEXN (benzene, toluene, ethylybenzene, xylenes, naphthalene)
- Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)
- Pesticides (organochlorine and organophosphate)
- Acid sulfates
- Asbestos.

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Investigation Methodology

Soil and sampling locations are presented on Figure 2 (**Appendix A**).

4.1 Soil Sampling

Details of the soil sampling program are presented below.

Table 4-1 Soil Sampling Works Summary

Activity/Item	Details
Date of Field Activities	23 and 24 November 2015
Service Location	Dial Before You Dig plans were reviewed and a survey of underground cables was conducted to locate underground services.
Boreholes	EGDS Pty Ltd was contracted to drill 8 boreholes. Hand tools were used to collect samples from the soil mound area. Boreholes were labelled BH1, BHA, BH2, BH3, BH4, BH5, BH6 and BH7. Surface samples from the mounds were labelled SP1, SP2, SP3 and SP4.
Soil Logging	Soil type classifications and descriptions are based on Unified Soil Classification System (USCS) and on Australian Standard AS4482.1-1997 *"Guide to sampling and investigation of potentially contaminated soil"*. Soil descriptions for the lithology encountered during drilling are presented in the borelogs in **Appendix C**.
Soil Sampling	Soil samples were taken directly from the solid stem auger head at the designated depth using nitrile gloves that were changed between samples. All soil samples were placed in clean, laboratory-supplied acid washed solvent rinsed glass jars. Asbestos and acid sulfate samples were placed inside laboratory supplied zip-lock bags.
Soil Screening	Soil samples were screened for the potential presence of hydrocarbons/volatile organic carbons (VOCs) using a photo-ionisation detector (PID), which was calibrated to a known concentration (100 parts per million (ppm)) of iso-butylene calibration gas. PID readings are presented on the logs in **Appendix C** and the calibration records are presented in **Appendix E**.
Decontamination Procedures	The drilling rods were washed and decontaminated between sampling locations with potable water.
Sample Preservation	Samples were stored on ice in an insulated cool box whilst on-site and during transit to the laboratory. All samples analysed for the contaminants of concern were submitted and analysed within the required holding period.
Disposal of Soil Cuttings	Soil cuttings were used to backfill bore holes once samples had been collected.

Activity/Item	Details
Disposal of consumable materials	Single use materials used during sampling were placed into garbage bags and disposed off-site.

4.1.1 Soil Sample Analysis

A total of 16 soil samples were analysed by ALS Environmental, as the selected NATA accredited testing laboratory. Analysis of the soil samples included:

- 13 primary soil samples were analysed for TPH/TRH, BTEXN, PAH and 8 heavy metals.
- 7 soil samples were analysed for the presence of asbestos.
- 6 primary soil samples were analysed for Pesticides (OC/OP).
- 2 soil samples were analysed for leachability.
- 3 soil samples were analysed for acid sulfates.
- 2 field quality control (QC) duplicate sample were analysed along with 1 trip blank.

4.2 Groundwater Sampling

Details of the groundwater sampling program are presented below.

Table 4-2 Groundwater Sampling Works Summary

Activity/Item	Details
Date of Field Activities	Well construction and development 23 November 2015. Well sampling 24 November 2015.
Well Construction	One temporary groundwater well was constructed at soil bore BH1. Construction materials consisted of 50mm uPVC casing/screen, 0.4mm aperture screen, 2mm washed sand, and bentonite pellet seal. The groundwater well was developed using a 12V submersible pump to remove silt and sediment.
Well Gauging	The groundwater wells were gauged using an oil/water interface probe for: • depth to groundwater (SWL – Standing Water Level) • total depth • presence of phase separated hydrocarbons (PSH).
Well Purging	The groundwater well was purged using a 12V submersible pump. Field parameter measurements were taken using a water quality meter for pH, dissolved oxygen (DO), reduction/oxidation potential (redox), temperature and electrical conductivity (EC). Field data sheets showing purging details are presented in **Appendix E**.
Sampling Method	One groundwater sample was collected using a disposable bailer and labelled BH1.

Activity/Item	Details
Sample Preservation	Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were stored on ice in a cooler while on-site and in transit to the laboratory. Samples collected for metals analysis were filtered onsite through a 0.45 μm filter cartridge and put in to preserved laboratory supplied bottles.
Decontamination Procedure	The oil / water interface probe was washed in Decon 90 solution and rinsed with potable water between measurements. The water quality meter was rinsed in potable water.
Disposal of consumable materials	Single use materials were placed in garbage bags and disposed off-site.

4.2.1 Groundwater Sample Analysis

For this investigation a total of 1 primary groundwater sample and 1 field duplicate sample (QA1) were collected. Samples were submitted to ALS for analysis for TPH/TRH, BTEXN, PAH, 8 heavy metals, and Pesticides. One trip blank sample was analysed for BTEXN.

4.3 Investigation Criteria

4.3.1 Soils

NEPM 2013 Health-based Investigation Levels

The National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013) Health-based Investigation Levels (HILs) provide a framework that is applicable for assessing human health risk via all relevant pathways of exposure and covers a broad range of metals and organic substances. Different levels are provided for a variety of exposure settings based on the land use scenario at a particular site.

The proposed land use for the site will be low density residential as the most sensitive use, as such the land use criteria adopted for HILs was:

- **HIL A**: Residential with garden/accessible soil including childcare centres, preschools and primary schools.

NEPM 2013 Health Screening Levels

The ASC NEPM 2013 HILs do not provide criteria for petroleum hydrocarbon chemicals, therefore the Health Screening Levels (HSLs) were developed and form part of the ASC NEPM 2013. The HSLs are designed to be protective of human health and are applicable to assessing human health risk via the inhalation pathway. The HSLs used in this report have not been adjusted for site specific parameters such as moisture content for this phase of work. HSLs are available for various depth profiles and predominant lithology (sand, silt and clay).

The proposed land use for the site will be low density residential as the most sensitive use, as such the land use criteria adopted for HSLs was:

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- **HSL A**: Residential with garden/accessible soil including childcare centres, preschools and primary schools.

NEPM 2013 Ecological Investigation/Screening Levels

The ASC NEPM 2013 Ecological Investigation levels and Ecological Screening Levels (EILs and ESLs) 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, whereas ESLs do not, and both are relevant to land use scenarios and apply to the top two (2) metres of soil. EILs take into account soil texture and age of the impacts, whereas ESLs account only for soil texture.

The ASC NEPM 2013 EIL Calculation Spreadsheet was used to calculate site specific EILs for copper, chromium, nickel and zinc. Nominal values were used to calculate ACLs and ABLs for each analyte.

NEPM 2013 Asbestos

The ASC NEPM 2013 asbestos guidelines have been developed for managing land use impacts associated with asbestos and are applicable for assessing risk to human health. The guideline has been derived from the Western Australian Department of Health (WA DoH 2009) guidance. The guidance covers bonded Asbestos Containing Material (bonded ACM), Fibrous Asbestos (FA) and Asbestos Fines (AF).

Note that these criteria were not used in this investigation given that the analysis was to assess for the presence of asbestos only and not to quantify asbestos materials in soils.

NEPM 2013 Aesthetic Considerations

In accordance with the ASC NEPM 2013, the aesthetic state of sites is required to be taken into account. Aesthetic issues generally relate to the presence of materials with a negligible risk or non-hazardous inert foreign material in soil or fill resulting from human activity. Sites that have been assessed as being acceptable from a human health and environmental perspective may still contain such foreign material. An assessment of the site aesthetics requires consideration of the natural state of soil on any given site, and a comparison between it and the soil encountered during investigation works.

In particular, soils on site should not exhibit discolouration (staining), a malodorous nature (odours) or abnormal consistency (rubble and trash).

NEPM 2013 Management Limits

The ASC NEPM 2013 Management Limits are relevant for TRH contaminants only. The Management Limits are specific for soil types (coarse and fine) and land uses. If adopted on a site, Management Limits are intended to avoid or minimise the potential effects of the following and require consideration of site-specific factors to determine the maximum depth to which the limits should apply:

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

4.3.2 Groundwater

The relevant adopted groundwater investigation levels (GILs) should be sourced from the ASC NEPM 2013 and supporting documents. The section below provides information on the adopted GILs.

Australian Drinking Water Guidelines (ADWG) 2011

The National Health and Medical Research Council (NHMRC) and Natural Resource Management Ministerial Council (NRMMC), National Water Quality Management Strategy, ADWG 2011 provides threshold levels for potable water resources.

NEPM 2013 HSL

The ASC NEPM 2013 HSLs have been derived for groundwater in relation to petroleum hydrocarbons; TRH fractions and BTEXN. The approach taken in the development of the HSLs has sought to set a reasonable maximum exposure that corresponds to common scenarios encountered with petroleum based contamination. The HSLs consider the potential risk to human health via the inhalation pathway only.

ANZECC 2000

The Australian and New Zealand Environment Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ) Water Quality Guidelines (ANZECC 2000 Guidelines) provide trigger values for organic and inorganic chemicals for the protection of freshwater and marine aquatic ecosystems.

For the purposes of this investigation, the receiving water environment of groundwater discharge would be the marine water ecosystem of Dee Why Lagoon, therefore GILs for the protection of marine water environments were adopted.

4.4 Quality Assurance and Quality Control

The investigation works were completed following standard operating procedures for conducting site contamination investigations. Standards followed included:

- General field documentation
- Health and safety
- Use of Personal Protective Equipment (PPE)
- Representative sample collection and labelling
- Equipment calibration
- Chain of Custody documentation for analytical samples
- Decontamination
- Collection of quality control samples (may include: intra laboratory, inter laboratory, rinsates, blanks, spikes).

The data validation guidelines adopted are based upon the following data validation guidance documents published by the United States Environmental Protection Agency (USEPA):

- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 540-R-10-011, dated January 2010)

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- USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, dated June 2008)
- National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 2013).

The process involves the checking of analytical procedure compliance and the assessment of the accuracy and precision of analytical data from a range of quality control measurements generated from both field sampling and analytical programs. Specific elements that have been checked and assessed for this project include:

- preservation and storage of samples upon collection and during transport to the laboratory
- holding times
- use of appropriate analytical procedures
- required LOR
- frequency of conducting quality control measurements
- laboratory blanks
- field duplicates
- laboratory duplicates
- matrix spike/matrix spike duplicates (MS/MSDs)
- surrogates (or System Monitoring Compounds)
- the occurrence of apparently unusual or anomalous results, e.g. laboratory results that appear to be inconsistent with field observations or measurements.

5

Results and Discussion

5.1 Field Observations

Field observations made during the drilling of the soil bores indicated the following:

- No odours or discolouration was noted in soil samples from boreholes or the groundwater sample.
- Minor oil staining was observed on the ground surface were bus parking is conducted.
- The PID readings showed no elevated volatiles in the samples collected.
- Soil samples collected from the soil mounds were described as follows:
    - SP1 – gravelly sand fill, dry, crushed brick/concrete/tiles, recycled material, bitumen gravels, slag gravels, fibro sheeting fragments.
    - SP2 – Sand with large cobble size gravels and clay lumps.
    - SP3 and SP4 – Silty sand, topsoil material, brown, dry, loose.

5.2 Soil Analytical Results and Discussion

5.2.1 Soils

Soil analytical data results are presented in Table 1 of **Appendix B** and in the laboratory reports contained in **Appendix F**. The QA/QC results reported in Table 1 along with the data validation process summarised in section 5.5 show that the results represent the conditions at the site and are considered acceptable for interpretive use.

The results presented in Table 1 show that all sample results meet the adopted soil investigation criteria and the soils across the site are of generally good quality.

The results for the soil mounds show that there is asbestos present in the fibro sheeting material within this fill. The asbestos is described as Chrysotile present as bonded asbestos cement sheeting approximately 50 x 40 x 4mm. Asbestos in the soil mounds could pose a risk if the soils are reused on the site.

5.2.2 Acid Sulfate Soils

Selected samples were subjected to chemical analysis to quantify the sulfur and acidity parameters of the soils that will be excavated for the basement construction and verify whether ASS will be encountered. The table below presents the summary analytical results, while laboratory analytical reports are presented in **Appendix F**.

The material that was analysed represented soil from various depths and various materials. For comparison to the action criteria, the general texture of the material was a coarse texture given the sandy nature of the soil.

The results summarised below show that the action criteria were exceeded. These results confirm the existence of ASS at a depth of at least 1.9m to a depth of at least 3.0m. As a precautionary measure, it is considered that all soils encountered below the watertable should be considered ASS.

The exceedance of the action criteria triggers the need to prepare an Acid Sulfate Soils Management Plan (ASSMP).

5 Results and Discussion

Table 5-1 Acid Sulfate Results

Sample ID	Depth (m)	Action Criteria (coarse texture)	
		Sulfur Trail (%S)	Acid Trail (mol H+/tonne)
		0.03	18
BHA_3.0	3.0	0.026	4
BH5_1.9	1.9m	**0.036**	14
BH6_3.0	3.0	0.021	**93**

5.2.3 Preliminary Waste Classification

Analytical results for samples representative of fill and natural soils (SP1 and BHA_3.0) that may require off-site disposal for constructing basement areas were compared against the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, 2014 (Waste Guidelines) to provide a preliminary waste classification.

The results presented in Table 3 (**Appendix B**) show that fill material at SP1 is classified as '**Special Waste – Asbestos**' and '**General Solid Waste (GSW)**'.

The results presented in Table 3 show that the natural soil at BHA_3.0 is classified as '**General Solid Waste (GSW)**'. Given the presence of ASS, natural soils cannot be classified as Virgin Excavated Natural Material (VENM).

Note that this waste classification is preliminary and is based on samples collected insitu. A comprehensive waste classification should be conducted on stockpiled material once excavated for the basement area and the material disposed of in accordance with the resulting waste classification to an appropriately licensed facility.

5.3 Site Hydrogeology

The following table presents details of site hydrogeology.

Table 5-2 Site Hydrogeology

Activity / Item	Description
Groundwater Occurrence	The Standing Water Level (SWL) at BH1 was 1.8mBTOC (metres below top of casing) and the depth of the well was 5.9mBTOC. TOC is 0.7m above ground level, therefore the watertable is 2.5m below ground.
Occurrence of PSH	No PSH was measured in the groundwater well and no hydrocarbon sheen or odours were observed.

Activity / Item	Description
Groundwater Flow Direction	Based on the surface topography and groundwater elevation, the inferred flow direction of groundwater is to the southeast along the alignment of Dee Why Creek towards Dee Why Lagoon.
Field Parameter Measurement	At the time of sampling the following measurements were taken: BH1: EC (298uS/cm), pH (4.5), Temp (20.2 °C), Redox (37mV), DO (1.99mg/L). The water was pale grey and turbid with no odours.

5.4 Groundwater Analytical Results and Discussion

Groundwater analytical results are presented in Table 2 (**Appendix B**) and in the laboratory reports contained in **Appendix F**. The QA/QC results reported in Table 2 along with the data validation process summarised in Section 5.5 show that the results represent the conditions at the site and are considered acceptable for interpretive use.

The results presented in Table 2 show that no contaminants reported results in excess of the adopted GILs, the exception the concentration of nickel and zinc at BH1 (and the field duplicate).

Elevated levels of zinc and nickel metals are common in galvanised and metallic structures in urbanised areas. It is noted that the fill/soil material present onsite shows very low concentrations of these metals, therefore the fill/soils are not the contamination source. The likely source is endemic sources in metallic structures in urbanised areas and considering the shallow groundwater is more vulnerable to these sources.

The concentrations are relatively low and not significant to warrant further assessment, and unlikely to pose any unacceptable risk to onsite or offsite receptors. However, if the groundwater bore is to be recommissioned, then groundwater should be tested to verify the water quality produced by the bore for future use.

5.5 Quality of Analytical Data

Analytical data validation is the process of assessing whether the data is in compliance with method requirements and project specifications. The primary objective of this process is to ensure that data of known quality are reported, and to identify if data can be used to fulfil the overall project objectives.

On the basis of the analytical data validation procedure employed, the overall quality of the soil analytical data produced is considered to be of an acceptable standard for interpretive use. The table below provides a summary of the data validation.

Table 5-3 Validation of Data Quality

Requirement	Compliance	Comments
Field Duplicates	Yes	Intra-laboratory duplicate samples were collected by splitting each sample into the primary and duplicate sample containers. 1 duplicate per 10 primary samples was analysed.

5 Results and Discussion

Requirement	Compliance	Comments
RPDs	Yes	All calculated RPDs fall within the acceptable range of <50%, the exception being samples with concentrations of <10 times the LOR which can show a higher RPD. A minor noncompliance was reported for Ni (SB3_0.2/QC2). The RPD was marginally over the 50% threshold and can be attributed to the heterogeneous nature of soils. Where concentrations of either sample is <LOR or <10 times the LOR, then no RPD is calculated.
Sampling equipment properly decontaminated	Yes	Disposable equipment used. Other equipment decontaminated between sampling locations.
Sample Preservation	Yes	Samples were properly preserved. Samples were compliant with required storage temperature.
Samples delivered to laboratory within sample holding times.	Yes	Confirmed from COCs and laboratory reports.
Equipment Calibration	Yes	Refer to **Appendix E**.
Blanks	Yes	Trip blank samples were analysed for soils and water samples.
Analytical procedures	Yes	All NATA accredited.
SOP and competent field personnel	Yes	Sampling procedures follow industry standards, and field staff (Adam Sullivan – 18 years experience) are competent in sampling methods and QA/QC protocols.

6

Conclusions and Recommendations

Conclusions

Based on the findings of this contamination investigation at the site, Sullivan-ES make the following conclusions:

- The site has had limited exposure to historical activities that may have caused contamination, which correlates well with soil analytical results showing that the site soils are of relatively good quality and meet the land use criteria for the proposed development. As such, the site soils are suitable for the proposed land use for recreational sporting activities and for independent-living residential apartments.
- Asbestos was detected at one location (SP1_0.2m) in the soil mounds located at the southern end of the site. This is considered a localised impact given that asbestos was not detected anywhere else nor was asbestos containing materials visually observed anywhere.
- Asbestos impacted soils in the soil mounds are unsuitable to remain on the site. A preliminary waste classification for the soil mounds is 'Special Waste – Asbestos' and 'General Solid Waste (GSW) for the material to be disposed offsite at a landfill. This classification should be confirmed by supplementary sampling during bulk earthworks prior to offsite removal to a landfill.
- ASS were confirmed to exist at the site in the natural soils. The chemical results exceed Action Criteria and require an ASS Management Plan to be prepared to document the appropriate management of the ASS during bulk earthworks to construct basements. The presence and extent of ASS should be confirmed by supplementary sampling during bulk earthworks.
- Natural soils that need to be excavated for the basement cannot be classified as VENM given the presence of ASS.
- Elevated concentrations of nickel and zinc are attributed to the endemic sources in an urbanised environment and the relatively susceptible shallow groundwater. The concentrations of nickel and zinc are relatively low and not significant to warrant further assessment, and unlikely to pose any unacceptable risk to onsite or offsite receptors. However, if the groundwater bore is to be recommissioned, then groundwater should be tested to verify the water quality produced by the bore for future use.

Recommendations

- Works required to remove asbestos impacted soil mounds should be the subject of a waste management plan (WMP) to be incorporated within construction management plans for the new development. The WMP should include details of sampling for waste classification purposes and management options to reuse, reduce or dispose of the waste materials including asbestos wastes.
- An ASS Management Plan should be prepared and form part of the construction management plans to address expected ASS during bulk earthworks. Details of further verification sampling should be included in the ASS Management Plan such that appropriate management procedures are included and contingency controls are suitable.

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References

Australian Standard 4482.1 Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, 2005.

Contaminated Land Management Act 1997 (CLM Act).

Warringah Local Environmental Plan 2011.

National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 2013).

NSW EPA, Sampling Design Guidelines, 1995.

NSW OEH, Guidelines for Consultants Reporting on Contaminated Sites, 2011.

NSW OEH Nature Conservation – Soils data online (http://www.environment.nsw.gov.au/soils/data.htm)

NSW DPI Office of Water – Continuous water monitoring network database (www.allwaterdata.water.nsw.gov.au).

NSW EPA, 2006, Guidelines for the NSW Site Auditor Scheme (2nd Edition).

Protection of the Environment Operations (Waste) Regulations 2005 (POEO – Waste Regulations).

State Environmental Planning Policy No.55 – Remediation of Land 1998 (SEPP55).

US EPA, 2000, Guidance for the Data Quality Objective Process, EPAC QA/G-4 DEC/600R-96/055, United States Environmental Protection Agency Office of Environmental Information, Washington DC.

US EPA, 2000, Data Quality Objectives for Hazardous Waste Site Investigations, EPA QA/G-4HW Final, Washington DC.

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 540-R-10-011, dated January 2010).

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, dated June 2008).

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Limitations

Sullivan Environmental Sciences Pty Ltd (Sullivan-ES) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of GJW Consultancy Pty Ltd and only those third parties who have been authorised in writing by Sullivan-ES to rely on this Report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report.

It is prepared in accordance with the Sullivan-ES fee proposal (18 November 2015) and email acceptance by GJW Consultancy Pty Ltd (24 November 2015).

Where this Report indicates that information has been provided to Sullivan-ES by third parties, Sullivan-ES has made no independent verification of this information except as expressly stated in the Report. Sullivan-ES assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared between 24 November 2015 and 18 January 2016 and is based on the conditions encountered and information reviewed at the time of preparation. Sullivan-ES disclaims responsibility for any changes that may have occurred after this time.

Investigations undertaken in respect of this Report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and contamination may have been identified in this Report.

Subsurface conditions can vary across a particular site and cannot be exhaustively defined by the investigations described in this Report.

This Report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This Report does not purport to give legal advice.

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It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

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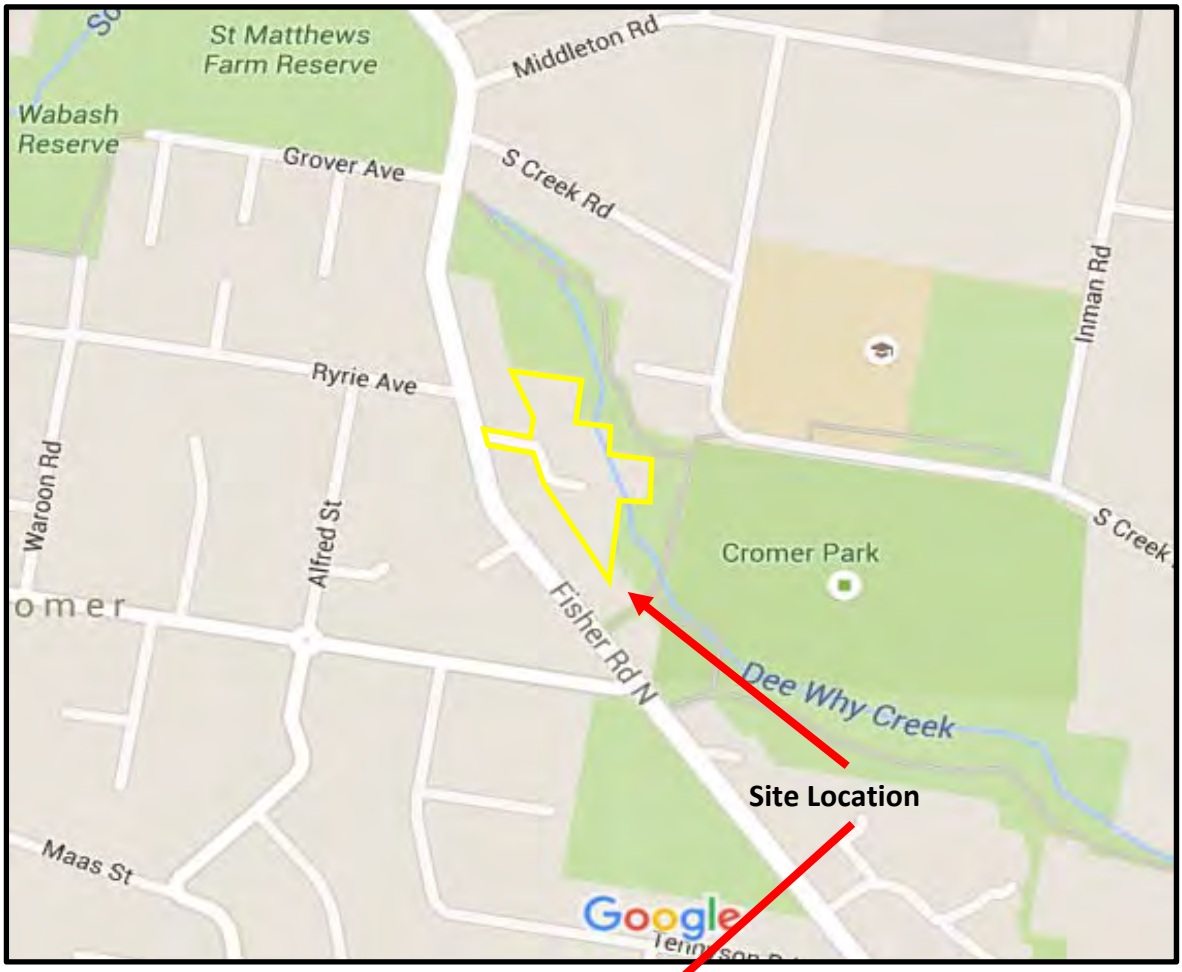
A

Appendix A Figures



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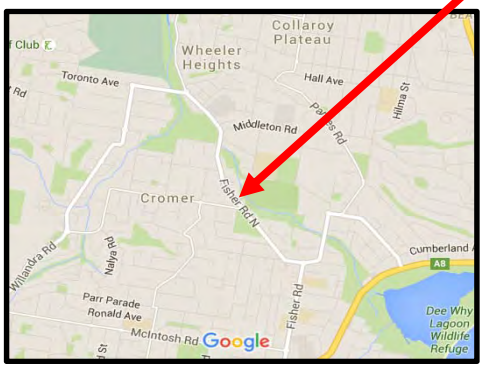


N

Not to scale

SULLIVAN environmental sciences	**Client:** GJW Consultancy Pty Ltd	**Figure 1:** Site Location
	Project: Contamination Investigation	
Project # SES_431	**Location:** 221-223 Fisher Road North, Dee Why NSW	**Date:** 18/1/2016

Soil bore

Groundwater well

Surface soil sample

All locations are approximate.

N

Imagery: Google Earth 2016

Not to scale

SULLIVAN environmental sciences	**Client:** GJW Consultancy Pty Ltd	**Figure 2:** Site Layout and Sampling Locations
	Project: Contamination Investigation	
Project # SES_431	**Location:** 221-223 Fisher Road North, Dee Why NSW	**Date:** 18/1/2016

B

Appendix B Results Tables

Table 1: Soil Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

Analyte	Moisture	Metals								Asbestos			TPH					TRH							BTEXN							
		Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	Sample Weight	Asbestos Detected	Asbestos Type	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Sum of BTEX	Total Xylenes	Naphthalene
Units	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g	g/kg	--	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	1	5	1	2	5	5	2	5	0.1	0.01	0.1	--	10	50	100	100	50	10	10	50	100	100	50	50	0.2	0.5	0.5	0.5	0.5	0.2	0.5	1
HIL A	--	100	20	100	6,000	300	400	7,400	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL A - inhalation	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45	--	--	--	--	110	0.5	160	55	--	--	--	40	3
HSL A - contact	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,400	--	4,500	6,300	--	3,300	100	14,000	4,500	--	--	--	12,000	1,400
EIL - residential	--	100	--	580	230	1,100	270	770	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	170
ESL - residential	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	180	--	300	2,800	--	120	50	85	70	--	--	--	105	--
Mgmt Limits - residential	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	700	--	2,500	10,000	--	1,000	--	--	--	--	--	--	--	--
BH1_0.3	0.3	23/11/2015	10.6	<5	<1	6	7	22	<2	27	<0.1	56.2	No	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH1_3.0	3.0	23/11/2015	19.6	<5	<1	13.0	<5	22.0	<2	<5	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
QC1	--	23/11/2015	21.7	<5	<1	12	<5	24	2	<5	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
RPD	--	--	10.2	--	--	8.0	--	8.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BHA_0.2	0.2	23/11/2015	14.5	<5	<1	12	11	52	5	55	0.1	48.1	No	--	<10	<50	<100	<100	<50	<10	<10	<50	100	<100	100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BHA_3.0	3.0	23/11/2015	18	<5	<1	13	<5	18	<2	<5	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH2_0.5	0.5	23/11/2015	8.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH3_0.1	0.1	23/11/2015	11.1	<5	<1	8	11	16	8	30	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH4_0.4	0.4	23/11/2015	12.1	<5	<1	7	<5	24	2	88	<0.1	43.0	No	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH5_0.4	0.4	24/11/2015	9.3	<5	<1	9	<5	8	2	<5	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH5_1.9	1.9	24/11/2015	13.6	<5	<1	8	<5	6	<2	<5	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
BH6_0.5	0.5	24/11/2015	14.6	7	<1	13	19	30	3	44	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
QC2	--	24/11/2015	14.0	<5	<1	10	11	19	3	24	<0.1	--	--	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
RPD	--	--	4.2	--	--	26.1	53.3	44.9	0.0	58.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH6_3.0	3.0	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH7_0.4	0.4	24/11/2015	11.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP1_0.2	0.2	23/11/2015	10.8	5	<1	11	17	185	3	93	<0.1	88.6	Yes	Ch	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
SP2_0.2	0.2	23/11/2015	16.4	6	<1	15	18	37	4	82	<0.1	50.7	No	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
SP3_0.2	0.2	23/11/2015	15.7	<5	<1	5	11	<5	3	28	<0.1	59.2	No	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
SP4_0.2	0.2	23/11/2015	10.8	<5	<1	5	12	5	3	27	0.1	52.2	No	--	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1
Trip Blank	--	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1

Legend
LOR - Limit of Reporting
mg/kg - milligrams per kilogram
Chromium - HIL criterion for Cr(VI) used
All EILs calculated for aged sources using NEPC EIL calculation spreadsheet with analytical data and assummed value of %clay at 30%, CEC at 20meq/100g, and pH at 7.
Where Non Limiting values occur for HSLs, then Csat value adopted.
HSL, ESL & Mgmt Limits use coarse materials

Table 1: Soil Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

Analyte	PAH																				
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	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	0.5	0.5	0.5	0.5	0.5
HIL A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	3	--	--	--
HSL A - inhalation	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL A - contact	1,400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EIL - residential	170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ESL - residential	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--	--
Mgmt Limits - residential	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample ID	Depth (m)	Date																				
BH1_0.3	0.3	23/11/2015	<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	<0.5	<0.5	0.6	1.2
BH1_3.0	3.0	23/11/2015	<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	<0.5	<0.5	0.6	1.2
QC1	--	23/11/2015	<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	<0.5	<0.5	0.6	1.2
RPD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BHA_0.2	0.2	23/11/2015	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	1.3	1.5	0.8	0.8	1.1	<0.5	0.9	<0.5	<0.5	0.6	7.5	1.1	1.4	1.7
BHA_3.0	3.0	23/11/2015	<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	<0.5	<0.5	0.6	1.2
BH2_0.5	0.5	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH3_0.1	0.1	23/11/2015	<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	<0.5	<0.5	0.6	1.2
BH4_0.4	0.4	23/11/2015	<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	<0.5	<0.5	0.6	1.2
BH5_0.4	0.4	24/11/2015	<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	<0.5	<0.5	0.6	1.2
BH5_1.9	1.9	24/11/2015	<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	<0.5	<0.5	0.6	1.2
BH6_0.5	0.5	24/11/2015	<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	<0.5	<0.5	0.6	1.2
QC2	--	24/11/2015	<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	<0.5	<0.5	0.6	1.2
RPD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH6_3.0	3.0	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH7_0.4	0.4	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP1_0.2	0.2	23/11/2015	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	2.1	1.9	0.8	0.7	0.8	<0.5	0.7	<0.5	<0.5	<0.5	8.5	0.9	1.2	1.5
SP2_0.2	0.2	23/11/2015	<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	<0.5	<0.5	0.6	1.2
SP3_0.2	0.2	23/11/2015	<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	<0.5	<0.5	0.6	1.2
SP4_0.2	0.2	23/11/2015	<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	<0.5	<0.5	0.6	1.2
Trip Blank	--	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Legend
LOR - Limit of Reporting
mg/kg - milligrams per kilogram
Chromium - HIL criterion for Cr(VI) used
All EILs calculated for aged sources using NEPC EIL calculation spreadsheet with analytical data and assummed value of %clay at 30%, CEC at 20meq/100g, and pH at 7.
Where Non Limiting values occur for HSLs, then Csat value adopted.
HSL, ESL & Mgmt Limits use coarse materials

Table 1: Soil Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

			Pesticides - OC																							Pesticides - OP																					
Analyte			alpha-BHC	Hexachlorobenzene (HCB)	beta-BHC	gamma-BHC	delta-BHC	Heptachlor	Aldrin	Heptachlor epoxide	Total Chlordane (sum)	trans-Chlordane	alpha-Endosulfan	cis-Chlordane	Dieldrin	4,4`-DDE	Endrin	beta-Endosulfan	Endosulfan (sum)	4,4`-DDD	Endrin aldehyde	Endosulfan sulfate	4,4`-DDT	Endrin ketone	Methoxychlor	Sum of Aldrin + Dieldrin	Sum of DDD + DDE + DDT	Dichlorvos	Demeton-S-methyl	Monocrotophos	Dimethoate	Diazinon	Chlorpyrifos-methyl	Parathion-methyl	Malathion	Fenthion	Chlorpyrifos	Parathion	Pirimphos-ethyl	Chlorfenvinphos	Bromophos-ethyl	Fenamiphos	Prothiofos	Ethion
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR			0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.2	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05
HIL A			--	10	--	--	--	6	--	--	50	--	--	--	--	--	10	--	270	--	--	--	--	--	300	6	240	--	--	--	--	--	--	--	--	--	160	--	--	--	--	--	--	--	--	--
HSL A - inhalation			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL A - contact			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EIL - residential			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ESL - residential			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mgmt Limits - residential			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sample ID	Depth (m)	Date																																													
BH1_0.3	0.3	23/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH1_3.0	3.0	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
QC1	--	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RPD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BHA_0.2	0.2	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BHA_3.0	3.0	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH2_0.5	0.5	23/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH3_0.1	0.1	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH4_0.4	0.4	23/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH5_0.4	0.4	24/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BH5_1.9	1.9	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH6_0.5	0.5	24/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
QC2	--	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RPD	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH6_3.0	3.0	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BH7_0.4	0.4	24/11/2015	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SP1_0.2	0.2	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP2_0.2	0.2	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP3_0.2	0.2	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP4_0.2	0.2	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trip Blank	--	23/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Legend
LOR - Limit of Reporting
mg/kg - milligrams per kilogram
Chromium - HIL criterion for Cr(VI) used
All EILs calculated for aged sources using NEPC EIL calculation spreadsheet with analytical data and assummed value of %clay at 30%, CEC at 20meq/100g, and pH at 7.
Where Non Limiting values occur for HSLs, then Csat value adopted.
HSL, ESL & Mgmt Limits use coarse materials

Table 1: Soil Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

Analyte	Carbophenothion	Azinphos Methyl
Units	mg/kg	mg/kg
LOR	0.05	0.05
HIL A	--	--
HSL A - inhalation	--	--
HSL A - contact	--	--
EIL - residential	--	--
ESL - residential	--	--
Mgmt Limits - residential	--	--

Sample ID	Depth (m)	Date		
BH1_0.3	0.3	23/11/2015	<0.05	<0.05
BH1_3.0	3.0	23/11/2015	--	--
QC1	--	23/11/2015	--	--
RPD	--	--	--	--
BHA_0.2	0.2	23/11/2015	--	--
BHA_3.0	3.0	23/11/2015	--	--
BH2_0.5	0.5	23/11/2015	<0.05	<0.05
BH3_0.1	0.1	23/11/2015	--	--
BH4_0.4	0.4	23/11/2015	<0.05	<0.05
BH5_0.4	0.4	24/11/2015	<0.05	<0.05
BH5_1.9	1.9	24/11/2015	--	--
BH6_0.5	0.5	24/11/2015	<0.05	<0.05
QC2	--	24/11/2015	--	--
RPD	--	--	--	--
BH6_3.0	3.0	24/11/2015	--	--
BH7_0.4	0.4	24/11/2015	<0.05	<0.05
SP1_0.2	0.2	23/11/2015	--	--
SP2_0.2	0.2	23/11/2015	--	--
SP3_0.2	0.2	23/11/2015	--	--
SP4_0.2	0.2	23/11/2015	--	--
Trip Blank	--	23/11/2015	--	--

Legend
LOR - Limit of Reporting
mg/kg - milligrams per kilogram
Chromium - HIL criterion for Cr(VI) used
All EILs calculated for aged sources using NEPC EIL calculation spreadsheet with analytical data and assummed value of %clay at 30%, CEC at 20meq/100g, and pH at 7.
Where Non Limiting values occur for HSLs, then Csat value adopted.
HSL, ESL & Mgmt Limits use coarse materials

Table 2: Groundwater Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

		Metals								TPH					TRH							BTEXN							
Analyte		Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Sum of BTEX	Total Xylenes	Naphthalene
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
LOR		0.001	0.0001	0.001	0.001	0.001	0.001	0.005	0.0001	20	50	100	50	50	20	20	100	100	100	100	100	1	2	2	2	2	1	2	5
GILs - Human		0.01	0.002	0.05	2.0	0.01	0.02	--	0.001	--	--	--	--	--	--	1,000	--	--	--	--	1,000	800	61,000	3,900	--	--	--	21,000	170
GILs - Eco		0.013	0.0007	0.0044	0.0013	0.0044	0.007	0.015	0.0001	--	--	--	--	--	--	--	--	--	--	--	--	500	--	--	--	--	--	200	50
Sample ID	Date																												
BH1	24/11/2015	<0.001	<0.0001	<0.001	<0.001	<0.001	0.014	0.051	<0.0001	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<1	<2	<5
QA1	24/11/2015	<0.001	<0.0001	<0.001	<0.001	<0.001	0.013	0.044	<0.0001	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<1	<2	<5
RPD (%)		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TB	24/11/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1	<2	<2	<2	<2	<1	<2	<5

Legend
LOR - Limit of Reporting
mg/L - milligrams per litre
ug/L - micograms per litre
TRH and BTEX HSLs used for coarse material with groundwater @ or >2m below the ground surface
Non Limiting values used for Toluene and Ethylbenzene for human GILs
GILs substituted when no criterion available.
GILs used for 99% and 95% protection of aquatic ecosystem
Most conservative GILs selected where required

Table 2: Groundwater Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

	PAH																	Pesticides - O												
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3-cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	alpha-BHC	Hexachlorobenzene (HCB)	beta-BHC	gamma-BHC	delta-BHC	Heptachlor	Aldrin	Heptachlor epoxide	Total Chlordane (sum)	trans-Chlordane	alpha-Endosulfan	cis-Chlordane	Dieldrin
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	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
	170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3	2.0	--	--	--	--
	50	--	--	--	--	--	--	--	--	--	--	--	0.01	--	--	--	--	--	--	--	--	--	--	0.01	--	--	0.03	--	--	--	--
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<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
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<0.5	<0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Legend
LOR - Limit of Reporting
mg/L - milligrams per litre
ug/L - micograms per litre
TRH and BTEX HSLs used for coarse material with groundwater @ or >2m below the ground surface
Non Limiting values used for Toluene and Ethylbenzene for human GILs
GILs substituted when no criterion available.
GILs used for 99% and 95% protection of aquatic ecosystem
Most conservative GILs selected where required

Table 2: Groundwater Analytical Results

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

iC													Pesticides - OP																			
4,4`-DDE	Endrin	beta-Endosulfan	Endosulfan (sum)	4,4`-DDD	Endrin aldehyde	Endosulfan sulfate	4,4`-DDT	Endrin ketone	Methoxychlor	Sum of Aldrin + Dieldrin	Sum of DDD + DDE + DDT	Dichlorvos	Demeton-S-methyl	Monocrotophos	Dimethoate	Diazinon	Chlorpyrifos-methyl	Parathion-methyl	Malathion	Fenthion	Chlorpyrifos	Parathion	Pirimphos-ethyl	Chlorfenvinphos	Bromophos-ethyl	Fenamiphos	Prothiofos	Ethion	Carbophenothion	Azinphos Methyl
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.0	0.5	2.0	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	0.5	0.5	0.5	0.5	0.5
--	--	--	20	--	--	--	--	--	--	0.3	9.0	5.0	--	--	7.0	4.0	--	0.7	70	7.0	10	20	--	2.0	--	0.5	--	4.0	--	30
--	0.004	--	0.005	--	--	--	--	--	--	--	0.006	--	--	--	0.15	0.01	--	--	0.05	--	0.009	0.004	--	--	--	--	--	--	--	--
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<2.0	<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	<0.5	<0.5	<0.5	<0.5	<0.5
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Legend
LOR - Limit of Reporting
mg/L - milligrams per litre
ug/L - micograms per litre
TRH and BTEX HSLs used for coarse material with groundwater @ or >2m below the ground surface
Non Limiting values used for Toluene and Ethylbenzene for human GILs
GILs substituted when no criterion available.
GILs used for 99% and 95% protection of aquatic ecosystem
Most conservative GILs selected where required

Table 3: Preliminary Waste Classification - SCC and TCLP Method

Dee Why Bowling Club
221-223 Fisher Road North, Dee Why NSW
GJW Consultancy Pty Ltd
Proj # SES_431

			TCLP Leach			Metals										PAH			TPH		Asbestos	
Analyte			Initial pH	After HCl pH	Final pH	Arsenic		Cadmium		Lead		Nickel		Mercury		Benzo(a)pyrene		Total PAH	TPH C6-C9	TPH C10-C36	Identification	Type and Form
Units			pH unit	pH unit	pH unit	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	ug/L	mg/kg	mg/kg	mg/kg	--	--
LOR			0.1	0.1	0.1	5	0.1	1	0.05	5	0.1	2	0.1	0.1	0.001	0.5	0.5	0.5	10	50	--	--
Special Waste			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Presence	--
GSW			--	--	--	500	5	100	1	1,500	5	1,050	2	50	0.2	10	40	200	650	10,000	--	--
RSW			--	--	--	2,000	20	400	4	6,000	20	4,200	8	200	0.8	23	160	800	2,600	40,000	--	--
Sample ID	Depth (m)	Date																				
Fill material																						
SP1_0.2	0.2	23/11/2015	9.3	1.6	5	5	<0.1	<1	<0.05	185	0.5	3	<0.1	<0.1	<0.0010	0.7	<0.5	8.5	<10	<50	Yes	Chrysotile. Bonded asbestos cement sheeting approximately 50 x 40 x 4mm.
Natural soil																						
BHA_3.0	3.0	23/11/2015	5.3	1.5	4.9	<5	<0.1	<1	<0.05	18	<0.1	<2	<0.1	<0.1	<0.0010	<0.5	<0.5	<0.5	<10	<50	No	--

Legend
LOR - Limit of Reporting
mg/kg - milligrams per kilogram
mg/L - milligrams per litre
ug/L - micrograms per litre

C

Appendix C Bore Logs

BOREHOLE LOG

SULLIVAN environmental sciences

Borehole No: **BH1**

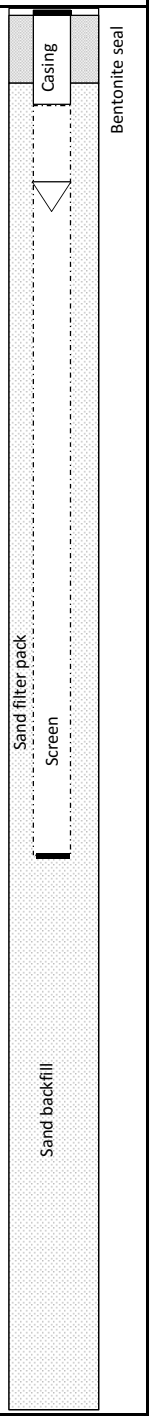
Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	23/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	23/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.

Drill Model: N/A Hole Angle: 90 deg Bore Size: 110mm RL:

Drilling Fluid: N/A Orientation: Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Fill: Sand, recycled concrete, cobble sizes, yellow/red colouring.	D	L	0.3	BH1_0.3	
	1.00			Clayey fill mixture.	M	F	0.1	BH1_1.0	
				Natural: Silty Clay, low plasticity, black/very dark grey.					
				Sandy Clay, low plasticity, grey, wet, swamp odour.					
	2								
	3.00			Clay, med/high plasticity, grey with red flexs and mottling, no odours.	M	S	0.0	BH1_3.0	
	4								
	5.00								
	6			Layered silty clays, sand and silts of varying thickness.					
	7.00								
	8								
	9.00								
	10			End of borehole and environmental sampling.					



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Checked By:	A.S.

Document No:

BOREHOLE LOG

Borehole No: **BHA**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	23/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	23/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.

Drill Model: N/A Hole Angle: 90 deg Bore Size: 110mm RL:
Drilling Fluid: N/A Orientation: Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Fill: Crushed rock.					
	0.50			Fill: Silty sand, dry, brown.	D	L	0.0	✖	BHA_0.2
	1			Natural: Sandy Clay, low plasticity, grey.	M	F			
	1.50								
	2			Clayey sand/sandy clay, uniform, grey, moist.					
	2.50								
	3			Clay, med. plasticity, grey, stiff, moist.			0.0	✖	BHA_3.0
				End of hole.					
	3.50								
	4								
	4.50								
	5								

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Checked By:	A.S.

Document No:

BOREHOLE LOG

Borehole No: **BH2**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	23/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	23/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.

Drill Model: N/A Hole Angle: 90 deg Bore Size: 110mm RL:

Drilling Fluid: N/A Orientation: Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Turf and topsoil.					
				Fill: Crushed sandstone and gravels, coarse, dry, stormwater pipe					
	0.50				D	D	0.1	✖	BH2_0.5
	1								
	1.50								
	2								
				Becoming moist/wet.					
	2.50								
				Natural: Sandy Clay, low plasticity, grey, moist/wet, soft.					
	3				M	S	0.0	✖	BH2_3.0
	3.50			Sand, coarse, uniform, pale grey, wet.					
	4								
	4.50			Clayey sand, coarse, grey, wet, med. dense.					
				Sandy clay, low plasticity, grey/red mottled, wet, firm.					
	5			End of contamination sampling borehole.					

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Checked By:	A.S.

Document No:

BOREHOLE LOG

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Borehole No: **BH3**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	23/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	23/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.

Drill Model: N/A Hole Angle: 90 deg Bore Size: 110mm RL:

Drilling Fluid: N/A Orientation: Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Fill: Gravel and rock, cobble sizes, sand, dry.	D	L	0.0	✖	BH3_0.1
	0.50			Natural: Silt, very dark grey/brown, soft. Sandy Clay, low plasticity, grey, soft, moist.					
	1								
	1.50								
	2								
	2.50			Sandy Clay, low plasticity, red with some grey mottles, soft, wet.	W	S	0.2	✖	BH3_2.5
	3			End of contamination sampling borehole.					
	3.50								
	4								
	4.50								
	5								

Produced By:	A.S.
Checked By:	A.S.

Document No:

BOREHOLE LOG

Borehole No: **BH4**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	23/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	23/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.

Drill Model: N/A Hole Angle: 90 deg Bore Size: 110mm RL:
Drilling Fluid: N/A Orientation: Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Concrete.					
				Fill: Clayey sand, grey.	M	D	0.0	✖	BH4_0.4
	0.50			Natural: Clayey Sand, dark grey grading to light grey.					
	1								
	1.50								
	2								
	2.50			Sandy Clay, low plasticity, red/brown, flexs of yellow/grey, soft to firm, moist.					
	3				M	S-F	0.2	✖	BH4_3.2
	3.50								
	4			Clay, med.plasticity, grey/red mottled, firm.					
	4.50			End of contamination sampling borehole.					
	5								

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Checked By:	A.S.

Document No:

BOREHOLE LOG

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Borehole No: **BH5**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	24/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	24/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.
Drill Model:	N/A	Hole Angle: 90 deg	Bore Size: 110mm RL:
Drilling Fluid:	N/A	Orientation:	Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Turf and topsoil					
	0.50			Natural: Clayey Sand, grey, loose.	M	L	0.2	✖	BH5_0.4
	1			Sandy Clay, med. plasticity, grey, stiff.					
	1.50				M	St	0.1	✖	BH5_1.9
	2			End of contamination sampling borehole.					
	2.50								
	3								
	3.50								
	4								
	4.50								
	5								

Produced By:	A.S.
Checked By:	A.S.

Document No:

BOREHOLE LOG

Borehole No: **BH6**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	24/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	24/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.
Drill Model:	N/A	Hole Angle: 90 deg	Bore Size: 110mm RL:
Drilling Fluid:	N/A	Orientation:	Co-ords:

Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Turf.					
	0.50			Fill: Silty Sand topsoil, loose, friable, dry, brown.	D	L	0.1	✖	BH6_0.5 (QC2)
	1			Natural: Clay, med./high plasticity, grey, moist, firm.					
	1.50								
	2								
	2.50								
	3			Clayey Sand, coarse, pale grey, med. density, moist, yellow hues.	M	MD	0.0	✖	BH6_3.0
	3.50			End of contamination sampling borehole.					
	4								
	4.50								
	5								

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Document No:

BOREHOLE LOG

SULLIVAN environmental sciences

Borehole No: **BH7**

Sheet 1 of 1

CLIENT:	GJW Consulting Pty Ltd	**JOB NUMBER:**	SES_431
PROJECT:	Contamination Investigation	**DATE COMMENCED:**	24/11/2015
LOCATION:	221-223 Fisher Road North, Dee Why	**DATE COMPLETED:**	24/11/2015
DRILL CONTRACTOR:	EGDS Pty Ltd	**LOGGED BY:**	A.S.
Drill Model:	N/A	Hole Angle: 90 deg	Bore Size: 110mm RL:
Drilling Fluid:	N/A	Orientation:	Co-ords:

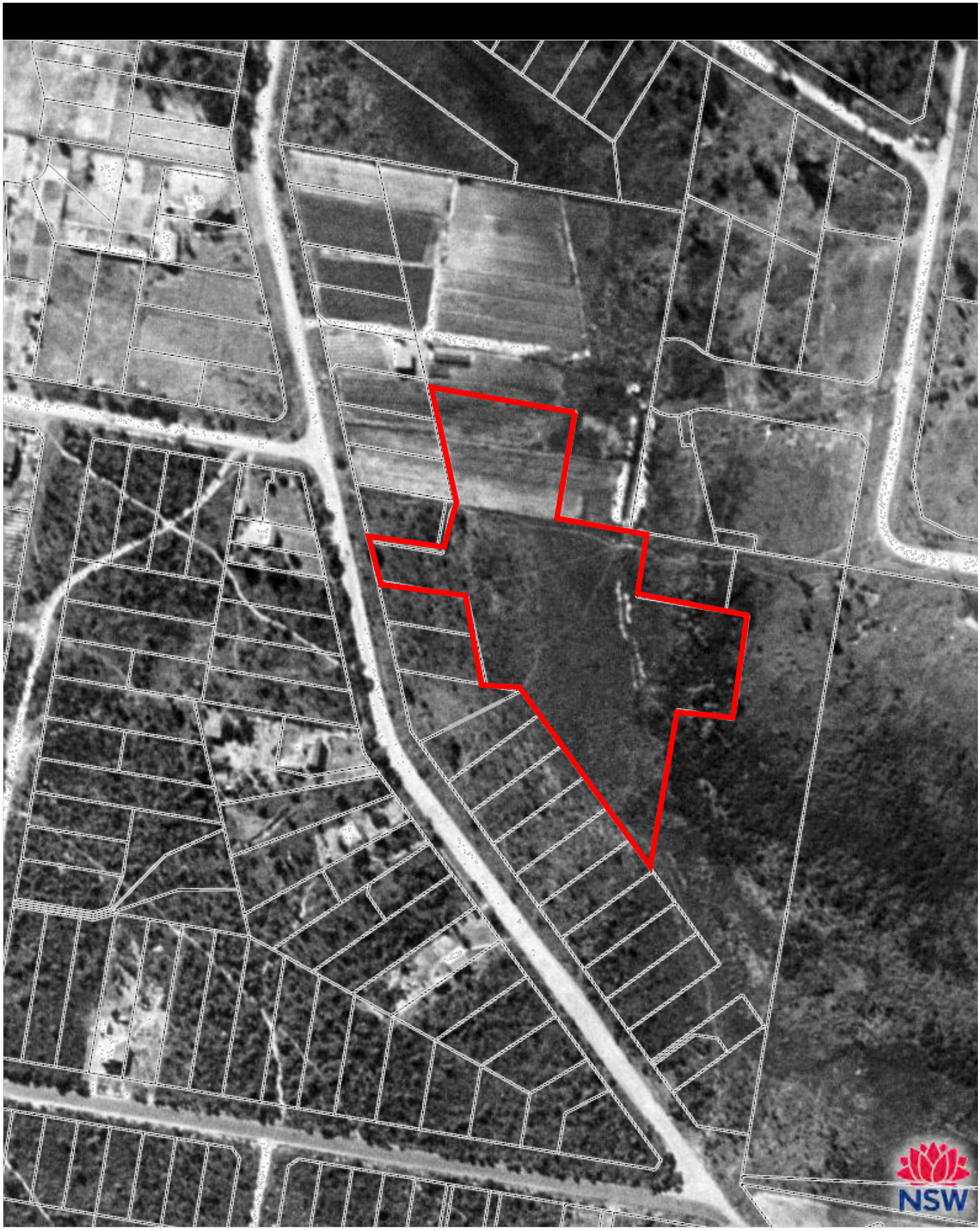
Method/ Casing	Depth (m)	Graphic Log	USCS Classification	Material Description: type, colour/mottling, plasticity/particle size,secondary/minor components, soil origin	Moisture	Consistency	PID	Sampling	Field Records: insitu testing, groundwater observations/regime, well construction details, additional information
Solid stem				Turf.					
				Fill: Topsoil, silty sand, friable, loose, moist, dark brown.	M	L	0.0	✖	BH7_0.4
	0.50								
	1			Natural: Sandy Silty Clay, low plasticity, dark brown, moist, soft.					
	1.50			Turning grey.					
	2								
	2.50								
	3			Natural: Sandy Clay and Clayey Sand, low plasticity, grey, moist, soft, high sand content, coarse .	M	S	0.0	✖	BH7_3.3
	3.50			End of contamination sampling borehole.					
	4								
	4.50								
	5								

Produced By:	A.S.
Checked By:	A.S.

Document No:

D

Appendix D Aerial Imagery



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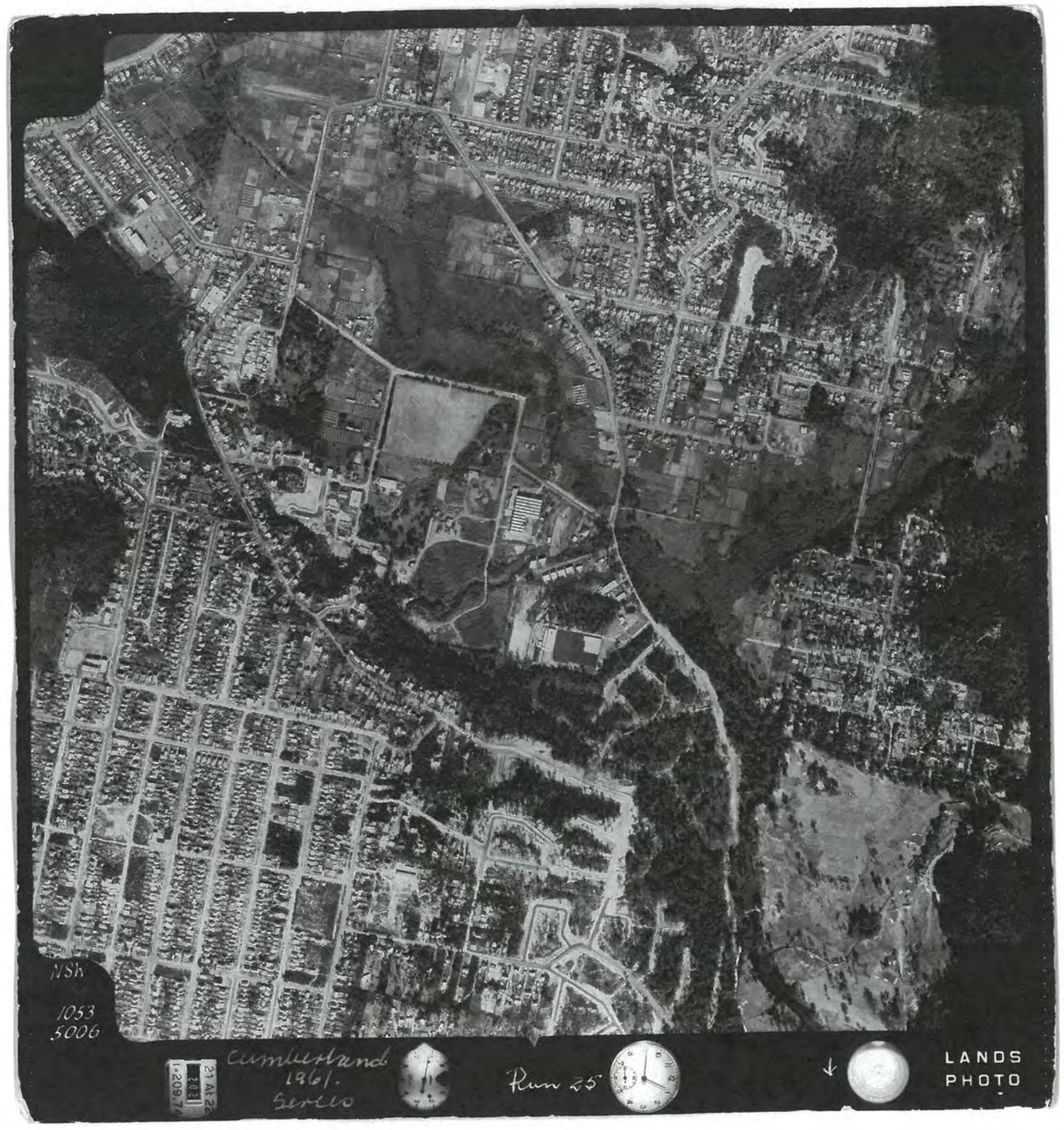
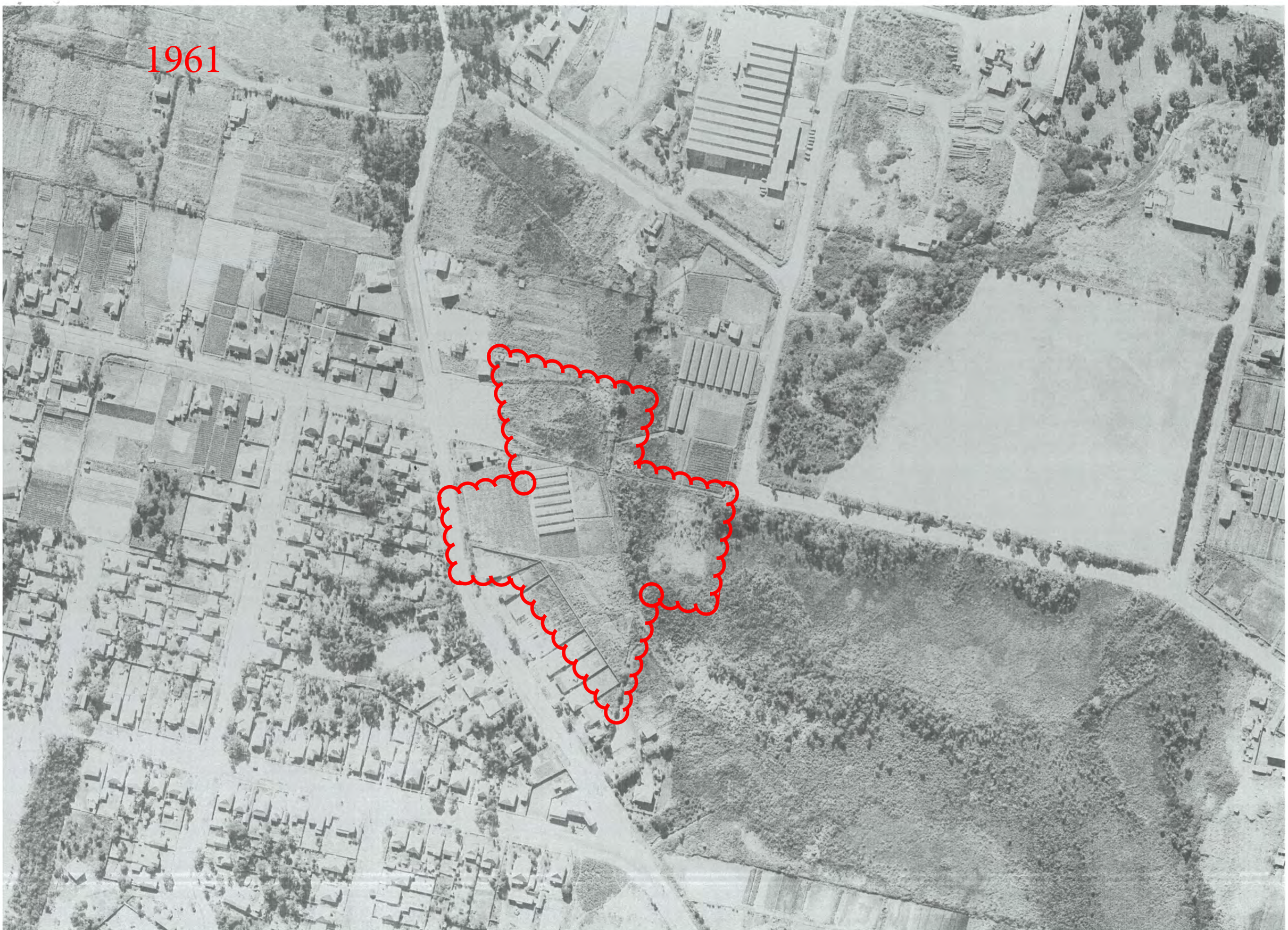
1943


473 22
BROKEN BAY RUN 5 MAY 51 12" 12200 ↓ LANDSPHOTO


NSh
1053
5006
Cumberland
1961.
Series
Run 25
LANDS
PHOTO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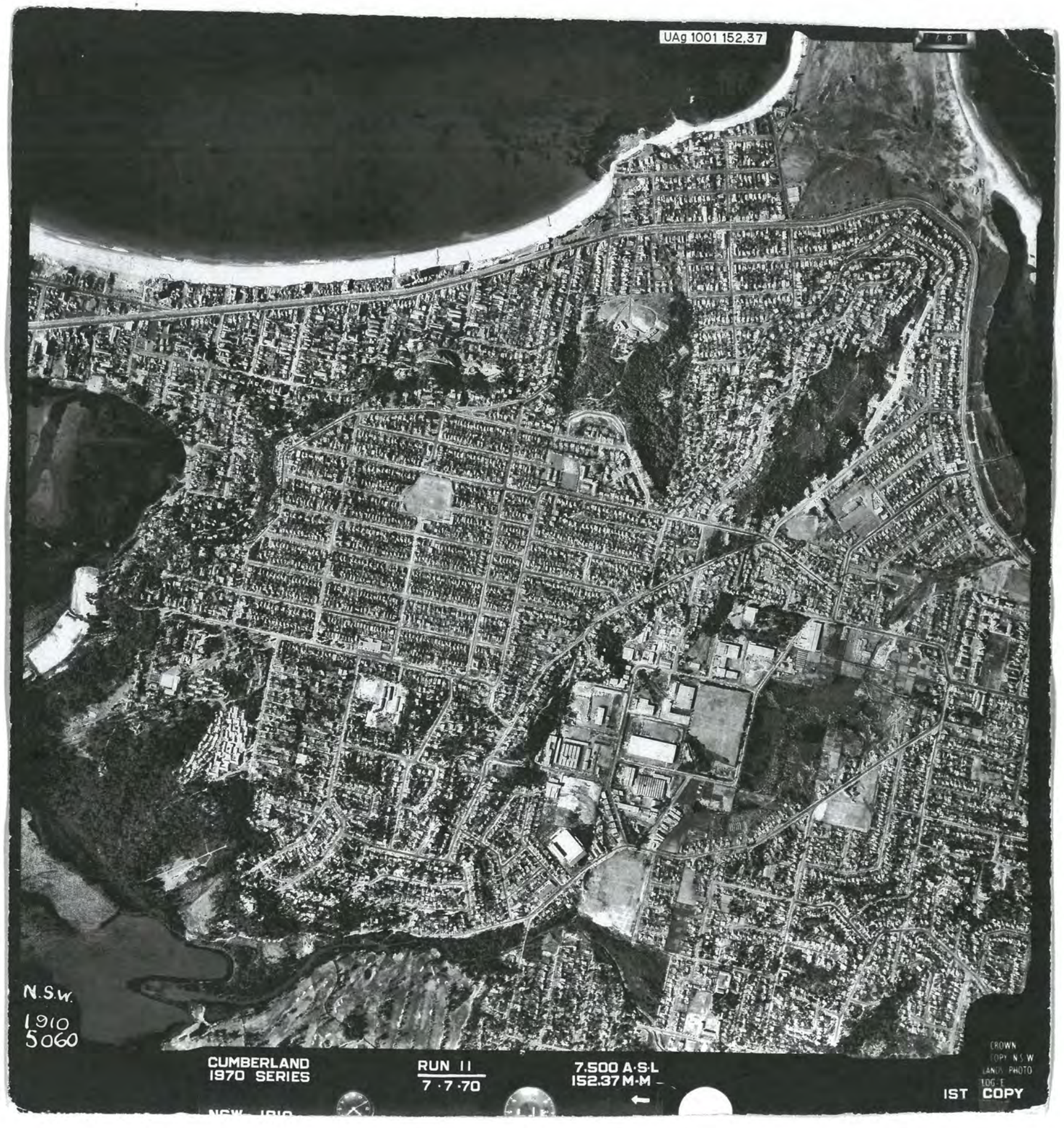
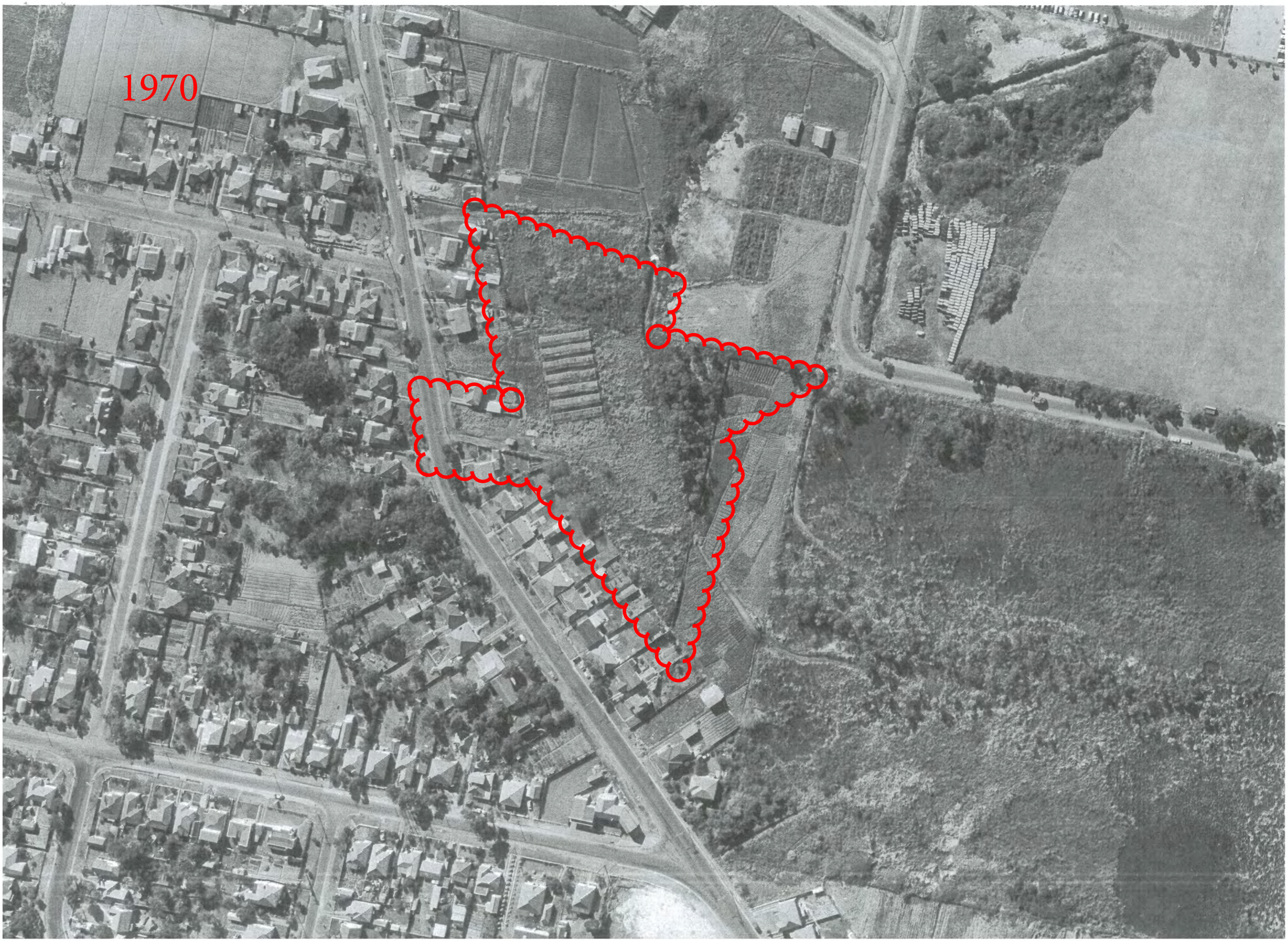

UAg 1001 152,37
N.S.W.
1910
5060
CUMBERLAND
1970 SERIES
RUN 11
7·7·70
7,500 A·S·L
152.37 M·M
CROWN
COPY N.S.W
LANDS PHOTO
LOG·E
1ST COPY


1970


UAq 1025 151.45
NSW
3266
105
SYDNEY 1982
1:16 000 COLOUR
(MISC 1474) NSW 3266
RUN 16E
7.11.82
2560 M ASL
151.45MM
IST COPY
CROWN
COPY N S W
LANDS PHOTO


1982


UAg 1025 151.45
144
SYDNEY
1:25000 COLOUR
NSW4029
RUN 7
26-8-91
4298 M ASL
151.45MM
COPYRIGHT
LANDS DEPT
NSW GOVT


1991


WILD 15/4 UAG-S
No.13217 152.76
0051
SYDNEY
1:25000 Approx. Scale
NSW4595 (M2302)
RUN 7
20-01-02
36-53
152.76 mm


2002

Google earth

feet 800
meters 200

Google earth

feet 700
meters 200

E

Appendix E Field Sheets and Calibration Records

ThermoFisher SCIENTIFIC

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RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

This Water Quality Meter has been performance checked and calibrated as follows:

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	7.00H / pH 4.00	4.00 pH	7.00 pH	1	☑
Conductivity	12.88 mS/cm	0 mS/cm	12.88 mS/cm		☑
TDS	36 ppk	0 ppk	33.5 ppk		☑
Dissolved Oxygen	Sodium Sulphite / Air	0 ppm in Sodium Sulphite	8.87 ppm Saturation in Air		☑

Check only

Redox (ORP) *	Electrode operability test	240mV +/- 10%	246 mV		☑

* This meter uses an Ag/AgCl ORP electrode. To convert readings to SHE (Standard Hydrogen Electrode), add 199mV to the mV reading.

☑ Battery Status 8.36 (min 7.2V)
☑ Electrical Safety Tag attached (AS/NZS 3760)

☑ Temperature 21.3 °C
☑ Electrodes Cleaned and checked

Tag No: 000609

Valid to: 19/01/2016

Date: 20/11/15

Signed: _____

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	90FLMV Unit. Ops check/Battery status: 8.35
☑	☐	pH sensor with wetting cap, 5m
☑	☐	Conductivity/TDS/Temperature K=10 sensor, 5m
☑	☐	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
☑	☐	Redox (ORP) sensor with wetting cap, 5m
☑	☐	Power supply 240V to 12V DC 200mA
☑	☐	Instruction Manual
☑	☐	Quick Guide
☑	☐	Plastic container with storage solution for pH and ORP sensors
☑	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)

Date: 20/11/15

Signed: _____

TFS Reference	CS003738	Return Date:	/ /
Customer Reference		Return Time:	
Equipment ID	90FLMV-2	Condition on return:	
Equipment Serial No.	W9488		

ThermoFisher SCIENTIFIC

The world leader in serving science

RENTALS

Equipment Report - MiniRAE 3000 PID

This Gas Meter has been performance checked and calibrated as follows:

Lamp	Compound	Concentration	Zero	Span	Traceability Lot #	Pass?
10.6 eV	Isobutylene	100 ppm	0.0 ppm	100.0 ppm	1808481 Cyl 2	☑

Alarm Limits

High	100 ppm
Low	50 ppm

Bump Test

Date	Target Gas	Reading	Pass?
20/11/2015	100 ppm	100.0 ppm	☑

☑ Battery Status 100%
☑ 10 minutes test complete
☑ Spare battery status (Min 5.5 volts)
☑ Electrical Safety Tag attached (AS/NZS 3760)

Tag No: 000357

Valid to: 20/02/2016

☑ Performance check (pump, lamp, sensor)
☑ Data cleared
☑ Filters checked

Date: 20/11/2015

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $30 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	MiniRAE 2000 PID / Operational Check / Battery Status 100%
☑	☐	Lamp 10.6 eV, Compound Set to: ISOBUTYLENE C/factor: 1
☑	☐	Protective yellow rubber boot
☑	☐	Inlet probe (attached to PID) 1
☑	☐	Spare water trap filter(s) Qty ____
☑	☐	Charger 240V to 12V1250mA
☑	☐	Cradle and Travel Charger
☑	☐	Instruction Manual behind foam on the lid of case "
☑	☐	Quick Guide Sheet behind foam on the lid of case "
☑	☐	Spare Alkaline Battery Compartment with batteries
☑	☐	Inline Moisture trap Filter Guide Laminated
☒	☐	Calibration regulator & tubing (optional)
☒	☐	Data cable and Software CD (optional)
☐	☐	Carry Case
☑	☐	Check to confirm electrical safety (tag must be valid)

Date: 20/11/2015

Signed: [signature]

TFS Reference	CS003733	Return Date:	/ /
Customer Reference		Return Time:	
Equipment ID	PID3000-8	Condition on return:	
Equipment Serial No.	592912660		

PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: BH1

Project No SES_431 Project Name Dee Why Bowlo Date 24/11/15 Sampled by:

Development

Development Method					
Time Started		SWL (start)		Volume Removed		Bore Depth (start)	
Time Stopped		SWL (end)		Discharge Rate		Bore Depth (end)	
Comments						NAPL Present (If yes thickness)	

Purging

stick up is 0.9mbtl

Purge Method		Purge Depth	1.78				
Time Started		SWL (start)	~~1.98~~ mbtoc	Bore Volume		Bore Depth (start)	5.9 mbtoc
Time Stopped		SWL (end)		Volume Removed	35L	Bore Depth (end)	
Comments	Purged dry with pump 3x. and recharge in b/w. 30L Purged with bailer 15L.					NAPL Present (If yes thickness)	—

Sampling

Sampling Method		Sampling Depth	
Time Started		SWL (start)	
Time Stopped		SWL (end)	
Comments			

OVA Monitoring

Time	Ambient	Bore Head	Discharge

Field Analyses

check against top water (pH 6.9) ok.

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
		298	4.5	20.2	37		1.99 ppm	pale grey

Prepared By:.....

Checked By:.....

F

Appendix F Laboratory Analytical Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1537260**	Page	: 1 of 32
Client	: **SULLIVAN ENVIRONMENTAL SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	:
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: adam@sullivan-es.com.au	E-mail	:
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: SES_431	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 26-Nov-2015 11:20
C-O-C number	: ----	Date Analysis Commenced	: 26-Nov-2015
Sampler	: ----	Issue Date	: 04-Dec-2015 14:48
Site	: ----		
		No. of samples received	: 27
Quote number	: ----	No. of samples analysed	: 22

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

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.

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.

- ASS: EA029 (SPOCAS): Excess ANC not required because pH OX less than 6.5.
- ASS: EA029 (SPOCAS): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from kg/t dry weight to kg/m3 in-situ soil, multiply reported results x wet bulk density of soil in t/m3.
- 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
- 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: SOIL (Matrix: SOIL)			Client sample ID	BHA_3.0	----	----	----	----
			Client sampling date / time	[23-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1537260-006	--------	--------	--------	--------
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	**5.9**	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	**4.4**	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**2**	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	**4**	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	**2**	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	**0.026**	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	**0.026**	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	**16**	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	**0.072**	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	**0.094**	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	**0.022**	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	**11**	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	**0.027**	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	**0.027**	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	**22**	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	**0.036**	----	----	----	----
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.03**	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**18**	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	**1**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BHA_3.0	----	----	----	----
				Client sampling date / time	[23-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1537260-006	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		18.0	----	----	----	----
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		13	----	----	----	----
Copper	7440-50-8	5	mg/kg		<5	----	----	----	----
Lead	7439-92-1	5	mg/kg		18	----	----	----	----
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	----	----	----	----
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		5.3	----	----	----	----
After HCl pH	----	0.1	pH Unit		1.5	----	----	----	----
Extraction Fluid Number	----	1	-		1	----	----	----	----
Final pH	----	0.1	pH Unit		4.9	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BHA_3.0	----	----	----	----
				Client sampling date / time	[23-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1537260-006	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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	----	----	----	----
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	1330-20-7	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**83.1**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**85.4**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**60.2**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**94.0**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BHA_3.0	----	----	----	----
				Client sampling date / time	[23-Nov-2015]	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1537260-006	--------	--------	--------	--------
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	0.5	%		**97.2**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**97.4**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**88.6**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%		**98.9**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**102**	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	BH1_0.3	BH1_3.0	QC1	BHA_0.2	BH2_0.5
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1537260-001	ES1537260-003	ES1537260-004	ES1537260-005	ES1537260-007
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	----	----
EA029-G: Retained Acidity								
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	----	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	----	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH1_0.3	BH1_3.0	QC1	BHA_0.2	BH2_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-001	ES1537260-003	ES1537260-004	ES1537260-005	ES1537260-007
					Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		----	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	----	----	----	----
Liming Rate	----	1	kg CaCO3/t		----	----	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		10.6	19.6	21.7	14.5	8.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	----	No	----
Asbestos Type	1332-21-4	-	--		-	----	----	-	----
Sample weight (dry)	----	0.01	g		56.2	----	----	48.1	----
APPROVED IDENTIFIER:	----	-	--		G.MORGAN	----	----	G.MORGAN	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		6	13	12	12	----
Copper	7440-50-8	5	mg/kg		7	<5	<5	11	----
Lead	7439-92-1	5	mg/kg		22	22	24	52	----
Nickel	7440-02-0	2	mg/kg		<2	<2	2	5	----
Zinc	7440-66-6	5	mg/kg		27	<5	<5	55	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	0.1	----
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		----	----	----	----	----
After HCl pH	----	0.1	pH Unit		----	----	----	----	----
Extraction Fluid Number	----	1	-		----	----	----	----	----
Final pH	----	0.1	pH Unit		----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	<0.05

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH1_0.3	BH1_3.0	QC1	BHA_0.2	BH2_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-001	ES1537260-003	ES1537260-004	ES1537260-005	ES1537260-007
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	----	----	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg		<0.05	----	----	----	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	----	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	----	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	----	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	----	----	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	----	<0.05

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH1_0.3	BH1_3.0	QC1	BHA_0.2	BH2_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-001	ES1537260-003	ES1537260-004	ES1537260-005	ES1537260-007
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	----	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	----	----	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	----	----	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	----	----	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	**0.5**	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	**1.3**	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	**1.5**	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	**0.8**	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	**0.8**	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	**1.1**	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	**0.9**	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	**0.6**	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	**7.5**	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	**1.1**	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**1.4**	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.7**	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH1_0.3	BH1_3.0	QC1	BHA_0.2	BH2_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-001	ES1537260-003	ES1537260-004	ES1537260-005	ES1537260-007
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		99.5	----	----	----	105
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		94.5	----	----	----	99.1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		81.4	80.0	77.3	83.1	----
2-Chlorophenol-D4	93951-73-6	0.5	%		84.4	83.2	81.4	86.2	----
2.4.6-Tribromophenol	118-79-6	0.5	%		68.0	57.7	54.4	69.0	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		92.8	92.1	91.3	92.4	----
Anthracene-d10	1719-06-8	0.5	%		96.8	96.2	93.8	94.4	----
4-Terphenyl-d14	1718-51-0	0.5	%		97.6	94.9	93.4	91.8	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		92.6	93.6	83.1	90.5	----
Toluene-D8	2037-26-5	0.2	%		94.5	99.4	90.4	102	----
4-Bromofluorobenzene	460-00-4	0.2	%		93.4	108	93.2	103	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	BH3_0.1	BH4_0.4	BH5_0.4	BH5_1.9	BH6_0.5
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1537260-009	ES1537260-011	ES1537260-013	ES1537260-014	ES1537260-015
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	**6.0**	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	**4.4**	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	<2	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	**14**	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	**14**	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	<0.020	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	**0.022**	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	**0.022**	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	<0.020	----
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	**0.036**	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	**0.036**	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	**22**	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	**0.096**	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	**0.096**	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	<0.020	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	<0.020	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	**0.022**	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	**0.022**	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	<0.020	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	<10	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	<0.020	----
EA029-G: Retained Acidity								
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	----	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	----	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH3_0.1	BH4_0.4	BH5_0.4	BH5_1.9	BH6_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-009	ES1537260-011	ES1537260-013	ES1537260-014	ES1537260-015
					Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	----	----	1.5	----
Net Acidity (sulfur units)	----	0.02	% S		----	----	----	0.04	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	----	----	22	----
Liming Rate	----	1	kg CaCO3/t		----	----	----	2	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		11.1	12.1	9.3	13.6	14.6
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		----	43.0	----	----	----
APPROVED IDENTIFIER:	----	-	--		----	G.MORGAN	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	7
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	7	9	8	13
Copper	7440-50-8	5	mg/kg		11	<5	<5	<5	19
Lead	7439-92-1	5	mg/kg		16	24	8	6	30
Nickel	7440-02-0	2	mg/kg		8	2	2	<2	3
Zinc	7440-66-6	5	mg/kg		30	88	<5	<5	44
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		----	----	----	----	----
After HCl pH	----	0.1	pH Unit		----	----	----	----	----
Extraction Fluid Number	----	1	-		----	----	----	----	----
Final pH	----	0.1	pH Unit		----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH3_0.1	BH4_0.4	BH5_0.4	BH5_1.9	BH6_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-009	ES1537260-011	ES1537260-013	ES1537260-014	ES1537260-015
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	<0.2	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	<0.2	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		----	<0.2	<0.2	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Diazinon	333-41-5	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		----	<0.2	<0.2	----	<0.2
Malathion	121-75-5	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Fenthion	55-38-9	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Parathion	56-38-2	0.2	mg/kg		----	<0.2	<0.2	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		----	<0.05	<0.05	----	<0.05

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH3_0.1	BH4_0.4	BH5_0.4	BH5_1.9	BH6_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-009	ES1537260-011	ES1537260-013	ES1537260-014	ES1537260-015
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Prothiofos	34643-46-4	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Ethion	563-12-2	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		----	<0.05	<0.05	----	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	**0.6**	**0.6**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	BH3_0.1	BH4_0.4	BH5_0.4	BH5_1.9	BH6_0.5
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-009	ES1537260-011	ES1537260-013	ES1537260-014	ES1537260-015
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	79.4	92.0	----	77.6
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	82.2	87.4	----	87.6
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		78.0	78.8	79.3	77.4	79.8
2-Chlorophenol-D4	93951-73-6	0.5	%		82.8	84.6	83.9	80.9	82.4
2.4.6-Tribromophenol	118-79-6	0.5	%		61.9	56.6	60.6	51.4	62.7
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		89.4	92.0	92.5	88.9	92.0
Anthracene-d10	1719-06-8	0.5	%		92.8	94.2	94.4	90.5	93.8
4-Terphenyl-d14	1718-51-0	0.5	%		90.8	92.0	95.2	89.9	93.3
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		92.5	90.6	98.4	98.1	93.2
Toluene-D8	2037-26-5	0.2	%		101	99.7	106	103	93.9
4-Bromofluorobenzene	460-00-4	0.2	%		101	100	107	106	96.0

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	QC2	BH6_3.0	BH7_0.4	SP1_0.2	SP2_0.2
			Client sampling date / time	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit	ES1537260-016	ES1537260-017	ES1537260-018	ES1537260-020	ES1537260-021
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	4.3	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	3.8	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	72	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	93	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	22	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	0.115	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	0.150	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	0.034	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	0.028	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	0.049	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	0.021	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	13	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	0.034	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	0.035	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	<0.020	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	<0.020	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	0.024	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	0.027	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	<0.020	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	<0.020	----	----	----
EA029-G: Retained Acidity								
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	0.028	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	<0.020	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	<0.020	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	QC2	BH6_3.0	BH7_0.4	SP1_0.2	SP2_0.2
				Client sampling date / time	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-016	ES1537260-017	ES1537260-018	ES1537260-020	ES1537260-021
					Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		----	1.5	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		----	0.13	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		----	82	----	----	----
Liming Rate	----	1	kg CaCO3/t		----	6	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		14.0	----	11.4	10.8	16.4
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	----	Yes	No
Asbestos Type	1332-21-4	-	--		----	----	----	Ch	-
Sample weight (dry)	----	0.01	g		----	----	----	88.6	50.7
APPROVED IDENTIFIER:	----	-	--		----	----	----	G.MORGAN	S.SPOONER
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	5	6
Cadmium	7440-43-9	1	mg/kg		<1	----	----	<1	<1
Chromium	7440-47-3	2	mg/kg		10	----	----	11	15
Copper	7440-50-8	5	mg/kg		11	----	----	17	18
Lead	7439-92-1	5	mg/kg		19	----	----	185	37
Nickel	7440-02-0	2	mg/kg		3	----	----	3	4
Zinc	7440-66-6	5	mg/kg		24	----	----	93	82
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	<0.1	<0.1
EN33: TCLP Leach									
Initial pH	----	0.1	pH Unit		----	----	----	9.3	----
After HCl pH	----	0.1	pH Unit		----	----	----	1.6	----
Extraction Fluid Number	----	1	-		----	----	----	1	----
Final pH	----	0.1	pH Unit		----	----	----	5.0	----
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	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	QC2	BH6_3.0	BH7_0.4	SP1_0.2	SP2_0.2
				Client sampling date / time	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-016	ES1537260-017	ES1537260-018	ES1537260-020	ES1537260-021
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
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	----	----
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	72-54-8/72-55-9/50-29-3	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	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	QC2	BH6_3.0	BH7_0.4	SP1_0.2	SP2_0.2
				Client sampling date / time	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-016	ES1537260-017	ES1537260-018	ES1537260-020	ES1537260-021
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
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	----	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	**1.5**	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	**2.1**	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	**1.9**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	**0.8**	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	**0.7**	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	**0.8**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	**0.7**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	**8.5**	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	**0.9**	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	----	----	**1.2**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	----	----	**1.5**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	----	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	----	----	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	----	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	<10	<10

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	QC2	BH6_3.0	BH7_0.4	SP1_0.2	SP2_0.2
				Client sampling date / time	[24-Nov-2015]	[23-Nov-2015]	[24-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]
Compound	CAS Number	LOR	Unit		ES1537260-016	ES1537260-017	ES1537260-018	ES1537260-020	ES1537260-021
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	----	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	----	----	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	----	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	----	----	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	----	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	----	----	<1	<1
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	94.2	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	104	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		78.6	----	----	81.9	77.7
2-Chlorophenol-D4	93951-73-6	0.5	%		83.2	----	----	86.1	82.9
2.4.6-Tribromophenol	118-79-6	0.5	%		62.1	----	----	74.0	61.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.2	----	----	95.3	90.5
Anthracene-d10	1719-06-8	0.5	%		91.9	----	----	97.9	94.5
4-Terphenyl-d14	1718-51-0	0.5	%		91.8	----	----	95.6	92.4
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		106	----	----	99.1	96.6
Toluene-D8	2037-26-5	0.2	%		111	----	----	102	99.3
4-Bromofluorobenzene	460-00-4	0.2	%		116	----	----	101	97.7

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	SP3_0.2	SP4_0.2	TRIP BLANK	----	----
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit	ES1537260-022	ES1537260-023	ES1537260-024	--------	--------
				Result	Result	Result	Result	Result
EA029-A: pH Measurements								
pH KCl (23A)	----	0.1	pH Unit	----	----	----	----	----
pH OX (23B)	----	0.1	pH Unit	----	----	----	----	----
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)	----	2	mole H+ / t	----	----	----	----	----
Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	----	----	----	----	----
Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	----	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	----	----	----	----	----
sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	----	----	----	----	----
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	----	----	----
Peroxide Sulfur (23De)	----	0.02	% S	----	----	----	----	----
Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	----	----	----	----	----
acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	----	----	----	----	----
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)	----	0.02	% Ca	----	----	----	----	----
Peroxide Calcium (23Wh)	----	0.02	% Ca	----	----	----	----	----
Acid Reacted Calcium (23X)	----	0.02	% Ca	----	----	----	----	----
acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	----	----	----	----	----
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	----	----	----	----	----
Peroxide Magnesium (23Tm)	----	0.02	% Mg	----	----	----	----	----
Acid Reacted Magnesium (23U)	----	0.02	% Mg	----	----	----	----	----
Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	----	----	----	----	----
EA029-G: Retained Acidity								
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	----	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	----	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	----	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	SP3_0.2	SP4_0.2	TRIP BLANK	----	----
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit	ES1537260-022	ES1537260-023	ES1537260-024	--------	--------
				Result	Result	Result	Result	Result
EA029-H: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	----	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	----	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	----	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	----	----	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1	%	**15.7**	**10.8**	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	----	----	----
Asbestos Type	1332-21-4	-	--	-	-	----	----	----
Sample weight (dry)	----	0.01	g	**59.2**	**52.2**	----	----	----
APPROVED IDENTIFIER:	----	-	--	**G.MORGAN**	**G.MORGAN**	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**5**	**5**	----	----	----
Copper	7440-50-8	5	mg/kg	**11**	**12**	----	----	----
Lead	7439-92-1	5	mg/kg	<5	**5**	----	----	----
Nickel	7440-02-0	2	mg/kg	**3**	**3**	----	----	----
Zinc	7440-66-6	5	mg/kg	**28**	**27**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	**0.1**	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	----	----	----	----	----
After HCl pH	----	0.1	pH Unit	----	----	----	----	----
Extraction Fluid Number	----	1	-	----	----	----	----	----
Final pH	----	0.1	pH Unit	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	----	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	----	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	SP3_0.2	SP4_0.2	TRIP BLANK	----	----
			Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit	ES1537260-022	ES1537260-023	ES1537260-024	--------	--------
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	----	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	----	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	SP3_0.2	SP4_0.2	TRIP BLANK	----	----
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit		ES1537260-022	ES1537260-023	ES1537260-024	--------	--------
					Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued									
Prothiofos	34643-46-4	0.05	mg/kg		----	----	----	----	----
Ethion	563-12-2	0.05	mg/kg		----	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg		----	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		----	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)				Client sample ID	SP3_0.2	SP4_0.2	TRIP BLANK	----	----
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	[23-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit		ES1537260-022	ES1537260-023	ES1537260-024	--------	--------
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**77.5**	**79.0**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**83.0**	**83.3**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**66.4**	**68.4**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**90.0**	**90.0**	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**91.2**	**91.8**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**90.4**	**91.6**	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**93.3**	**98.6**	**101**	----	----
Toluene-D8	2037-26-5	0.2	%		**79.8**	**102**	**103**	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**87.4**	**100**	**104**	----	----

Analytical Results

Sub-Matrix: TCLP LEACHATE (Matrix: WATER)				Client sample ID	BHA_3.0	SP1_0.2	----	----	----
				Client sampling date / time	[23-Nov-2015]	[23-Nov-2015]	----	----	----
Compound	CAS Number	LOR	Unit		ES1537260-006	ES1537260-020	--------	--------	--------
					Result	Result	Result	Result	Result
EG005C: Leachable Metals by ICPAES									
Arsenic	7440-38-2	0.1	mg/L		<0.1	<0.1	----	----	----
Cadmium	7440-43-9	0.05	mg/L		<0.05	<0.05	----	----	----
Lead	7439-92-1	0.1	mg/L		<0.1	**0.5**	----	----	----
Nickel	7440-02-0	0.1	mg/L		<0.1	<0.1	----	----	----
EG035C: Leachable Mercury by FIMS									
Mercury	7439-97-6	0.001	mg/L		<0.0010	<0.0010	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		**24.9**	**22.5**	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%		**51.6**	**47.0**	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%		**65.0**	**59.0**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		**65.4**	**59.1**	----	----	----
Anthracene-d10	1719-06-8	1	%		**98.9**	**98.6**	----	----	----
4-Terphenyl-d14	1718-51-0	1	%		**69.8**	**65.9**	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	BH1	QA1	TB	----	----
			Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit	ES1537260-025	ES1537260-026	ES1537260-027	--------	--------
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L	**0.014**	**0.013**	----	----	----
Zinc	7440-66-6	0.005	mg/L	**0.051**	**0.044**	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
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	----	----	----	----
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	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2	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	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	QA1	TB	----	----
				Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit		ES1537260-025	ES1537260-026	ES1537260-027	--------	--------
					Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued									
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	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	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	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	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1	µg/L		<1.0	<1.0	----	----	----
Acenaphthylene	208-96-8	1	µg/L		<1.0	<1.0	----	----	----
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	----	----	----
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	----	----	----
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	----	----	----
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	----	----	----
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	----	----	----
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	----	----	----
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	----	----	----
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	----	----	----
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<1.0	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	QA1	TB	----	----
				Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit		ES1537260-025	ES1537260-026	ES1537260-027	--------	--------
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	----	----	----
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	----	----	----
Benzo(g.h.i)perylene	191-24-2	1	µg/L		<1.0	<1.0	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	<100	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	1330-20-7	2	µg/L		<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		**79.9**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		**115**	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH1	QA1	TB	----	----
				Client sampling date / time	[24-Nov-2015]	[24-Nov-2015]	[24-Nov-2015]	----	----
Compound	CAS Number	LOR	Unit		ES1537260-025	ES1537260-026	ES1537260-027	--------	--------
					Result	Result	Result	Result	Result
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1	%		27.0	27.5	----	----	----
2-Chlorophenol-D4	93951-73-6	1	%		55.9	55.3	----	----	----
2.4.6-Tribromophenol	118-79-6	1	%		72.6	75.6	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1	%		74.2	75.6	----	----	----
Anthracene-d10	1719-06-8	1	%		97.2	95.9	----	----	----
4-Terphenyl-d14	1718-51-0	1	%		76.3	76.2	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		110	103	132	----	----
Toluene-D8	2037-26-5	2	%		103	107	107	----	----
4-Bromofluorobenzene	460-00-4	2	%		92.0	92.5	87.8	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOLID**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH1_0.3 - [23-Nov-2015]	Mid brown sandy soil.
EA200: Description	BHA_0.2 - [23-Nov-2015]	Mid brown sandy soil with grey rocks.
EA200: Description	BH4_0.4 - [23-Nov-2015]	Mid brown sandy soil.
EA200: Description	SP1_0.2 - [23-Nov-2015]	Mid brown sandy soil with one piece of bonded asbestos cement sheeting approximately 50 x 40 x 4mm.
EA200: Description	SP2_0.2 - [23-Nov-2015]	Mid brown clay soil with grey rocks.
EA200: Description	SP3_0.2 - [23-Nov-2015]	Mid brown sandy soil with plenty of vegetation.
EA200: Description	SP4_0.2 - [23-Nov-2015]	Mid brown sandy soil with plenty of vegetation.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1537260**	Page	: 1 of 17
Client	: **SULLIVAN ENVIRONMENTAL SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	:
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: adam@sullivan-es.com.au	E-mail	:
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: SES_431	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ----	Date Samples Received	: 26-Nov-2015
C-O-C number	: ----	Date Analysis Commenced	: 26-Nov-2015
Sampler	: ----	Issue Date	: 04-Dec-2015
Site	: ----	No. of samples received	: 27
Quote number	: ----	No. of samples analysed	: 22

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
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
RPD = Relative Percentage Difference
# = Indicates failed QC

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics
Satishkumar Trivedi	Acid Sulfate Soils Supervisor	Brisbane Acid Sulphate Soils
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-A: pH Measurements (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: pH KCl (23A)	----	0.1	pH Unit	5.9	5.9	0.00	0% - 20%
		EA029: pH OX (23B)	----	0.1	pH Unit	4.4	4.4	0.00	0% - 20%
EA029-B: Acidity Trail (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	<0.020	0.00	No Limit
		EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	2	2	0.00	No Limit
		EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	4	5	0.00	No Limit
		EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	2	3	0.00	No Limit
EA029-C: Sulfur Trail (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	0.026	0.029	10.1	No Limit
		EA029: Peroxide Sulfur (23De)	----	0.02	% S	0.026	0.029	10.1	No Limit
		EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	16	18	10.1	No Limit
EA029-D: Calcium Values (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	0.022	<0.020	9.07	No Limit
		EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	0.072	0.077	5.91	No Limit
		EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	0.094	0.095	1.27	No Limit
		EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	<0.020	0.00	No Limit
		EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	11	<10	0.00	No Limit
EA029-E: Magnesium Values (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	0.027	0.029	6.03	No Limit
		EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	<0.020	0.00	No Limit
		EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	0.027	0.029	6.03	No Limit
		EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	0.036	0.038	6.03	No Limit
		EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	22	24	6.03	No Limit
EA029-H: Acid Base Accounting (QC Lot: 296522)									
ES1537260-006	BHA_3.0	EA029: ANC Fineness Factor	----	0.5	-	1.5	1.5	0.00	No Limit
		EA029: Net Acidity (sulfur units)	----	0.02	% S	0.03	0.03	0.00	No Limit
		EA029: Liming Rate	----	1	kg CaCO3/t	1	2	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA029-H: Acid Base Accounting (QC Lot: 296522) - continued									
ES1537260-006	BHA_3.0	EA029: Net Acidity (acidity units)	----	10	mole H+ / t	18	20	10.4	No Limit
EA055: Moisture Content (QC Lot: 290967)									
ES1537251-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.4	12.2	1.76	0% - 50%
ES1537252-009	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	11.3	10.1	11.0	0% - 50%
EA055: Moisture Content (QC Lot: 290968)									
ES1537260-011	BH4_0.4	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.1	13.4	10.6	0% - 50%
ES1537267-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.9	12.9	0.00	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 294534)									
ES1537260-001	BH1_0.3	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	5	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	7	8	16.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	22	25	16.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	27	27	0.00	No Limit
ES1537260-016	QC2	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	11	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	3	3	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	11	12	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	19	21	6.73	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	24	26	9.60	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 294533)									
ES1537260-001	BH1_0.3	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1537260-016	QC2	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 291000)									
ES1537260-001	BH1_0.3	EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 291000) - continued									
ES1537260-001	BH1_0.3	EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 291000)									
ES1537260-001	BH1_0.3	EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 290999)									
ES1537260-016	QC2	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 290999) - continued									
ES1537260-016	QC2	EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1537260-001	BH1_0.3	EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 290997)									
ES1537260-001	BH1_0.3	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1537260-016	QC2	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 290998)									
ES1537260-016	QC2	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537260-001	BH1_0.3	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 290997)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 290997) - continued									
ES1537260-001	BH1_0.3	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1537260-016	QC2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 290998)									
ES1537260-016	QC2	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1537260-001	BH1_0.3	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 290997)									
ES1537260-001	BH1_0.3	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1537260-016	QC2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005C: Leachable Metals by ICPAES (QC Lot: 293453)									
EB1535368-002	Anonymous	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES1537320-016	Anonymous	EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	<0.05	0.00	No Limit
		EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	0.00	No Limit
		EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 294748)									
ES1537260-025	BH1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 294748) - continued									
ES1537260-025	BH1	EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.014	0.014	0.00	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.051	0.047	7.55	0% - 50%
ES1537554-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.010	0.011	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.018	0.020	12.3	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.054	0.058	7.11	0% - 50%
EG035C: Leachable Mercury by FIMS (QC Lot: 294967)									
EB1535368-002	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
ES1537462-009	Anonymous	EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 294749)									
ES1537260-026	QA1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1537554-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 291972)									
ES1537259-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1537259-009	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 291972)									
ES1537259-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1537259-009	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 291972)									
ES1537259-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1537259-009	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA029-A: pH Measurements (QCLot: 296522)								
EA029: pH KCl (23A)	----	0.1	pH Unit	<0.1	4.8 pH Unit	97.9	70	130
EA029: pH OX (23B)	----	0.1	pH Unit	<0.1	4.1 pH Unit	95.1	70	130
EA029-B: Acidity Trail (QCLot: 296522)								
EA029: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Peroxide Acidity (s-23G)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: sulfidic - Titratable Sulfidic Acidity (s-23H)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	15 mole H+ / t	82.2	70	130
EA029: Titratable Peroxide Acidity (23G)	----	2	mole H+ / t	<2	40 mole H+ / t	107	70	130
EA029: Titratable Sulfidic Acidity (23H)	----	2	mole H+ / t	<2	----	----	----	----
EA029-C: Sulfur Trail (QCLot: 296522)								
EA029: acidity - Peroxide Oxidisable Sulfur (a-23E)	----	10	mole H+ / t	<10	----	----	----	----
EA029: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.020	0.052 % S	114	70	130
EA029: Peroxide Oxidisable Sulfur (23E)	----	0.02	% S	<0.020	----	----	----	----
EA029: Peroxide Sulfur (23De)	----	0.02	% S	<0.020	0.158 % S	99.0	70	130
EA029-D: Calcium Values (QCLot: 296522)								
EA029: Acid Reacted Calcium (23X)	----	0.02	% Ca	<0.020	----	----	----	----
EA029: acidity - Acid Reacted Calcium (a-23X)	----	10	mole H+ / t	<10	----	----	----	----
EA029: KCl Extractable Calcium (23Vh)	----	0.02	% Ca	<0.020	0.097 % Ca	93.7	70	130
EA029: Peroxide Calcium (23Wh)	----	0.02	% Ca	<0.020	0.22 % Ca	107	70	130
EA029: sulfidic - Acid Reacted Calcium (s-23X)	----	0.02	% S	<0.020	----	----	----	----
EA029-E: Magnesium Values (QCLot: 296522)								
EA029: Acid Reacted Magnesium (23U)	----	0.02	% Mg	<0.020	----	----	----	----
EA029: Acidity - Acid Reacted Magnesium (a-23U)	----	10	mole H+ / t	<10	----	----	----	----
EA029: KCl Extractable Magnesium (23Sm)	----	0.02	% Mg	<0.020	0.25 % Mg	94.8	70	130
EA029: Peroxide Magnesium (23Tm)	----	0.02	% Mg	<0.020	0.234 % Mg	104	70	130
EA029: sulfidic - Acid Reacted Magnesium (s-23U)	----	0.02	% S	<0.020	----	----	----	----
EA029-G: Retained Acidity (QCLot: 296522)								
EA029: acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	<10	----	----	----	----
EA029: HCl Extractable Sulfur (20Be)	----	0.02	% S	<0.020	0.026 % S	124	70	130
EA029: Net Acid Soluble Sulfur (20Je)	----	0.02	% S	<0.020	----	----	----	----
EA029: sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	<0.020	----	----	----	----
EA029-H: Acid Base Accounting (QCLot: 296522)								
EA029: ANC Fineness Factor	----	0.5	-	<0.5	----	----	----	----

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA029-H: Acid Base Accounting (QCLot: 296522) - continued								
EA029: Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----
EA029: Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
EA029: Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 294534)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	108	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	98.3	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	104	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	110	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.3	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	105	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	102	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 294533)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	78.4	70	105
EN33: TCLP Leach (QCLot: 291863)								
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 291000)								
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	69	121
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	67	115
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	91.6	66	120
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	69	115
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	94.7	69	113
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	66	116
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	67	119
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.0	69	115
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	64	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	76.7	65	117
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	90.4	66	116
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	106	62	124
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	67	123
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	103	56	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	97.0	64	122
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	68	116
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	67	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	62	118
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.4	65	117
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	76.7	54	130

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 291000) - continued								
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	80.6	63	117
EP068B: Organophosphorus Pesticides (OP) (QCLot: 291000)								
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	63.4	41	123
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	66	118
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	106	65	127
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.5	69	121
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	76	118
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	88.7	72	120
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	106	62	128
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	70	120
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	76.7	59	119
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.5	67	119
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	68	120
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	68	124
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.9	69	117
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.9	68	122
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	95.3	54	126
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	92.3	64	122
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	93.2	68	120
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	70	116
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	95.2	62	112
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 290999)								
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.1	73	127
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	88.6	72	124
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	94.4	77	127
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.4	69	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	87.3	70	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	85.0	68	116
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	79.4	63	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	93.8	74	126
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	96.1	75	127
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	80.9	62	118
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	93.8	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	89.8	72	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	76.6	61	121
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	91.2	77	125
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	92.8	75	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	94.3	74	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 290997)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	74.2	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 290998)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	106	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	116	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	107	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 290997)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	72.7	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 290998)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	110	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	115	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	95.3	63	131
EP080: BTEXN (QCLot: 290997)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	75.7	62	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	75.0	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	77.8	66	118
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	74.7	63	119
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	83.5	68	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	80.9	67	121

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005C: Leachable Metals by ICPAES (QCLot: 293453)								
EG005C: Arsenic	7440-38-2	0.1	mg/L	<0.1	0.1 mg/L	106	80	124
EG005C: Cadmium	7440-43-9	0.05	mg/L	<0.05	0.1 mg/L	99.9	80	118
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	102	80	118
EG005C: Nickel	7440-02-0	0.1	mg/L	<0.1	0.1 mg/L	99.5	83	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 294748)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.9	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.4	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.7	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.2	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	102	81	117
EG035C: Leachable Mercury by FIMS (QCLot: 294967)								
EG035C: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.4	79	109

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG035F: Dissolved Mercury by FIMS (QCLot: 294749)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.4	83	105
EP068A: Organochlorine Pesticides (OC) (QCLot: 290971)								
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	87.6	72	122
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	87.1	67	119
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	93.2	60	122
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	85.8	66	116
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	77.5	65	113
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	86.0	66	120
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	88.1	69	117
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	89.8	71	119
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	84.9	64	120
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	77.9	67	117
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	82.5	66	120
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	85.4	60	126
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	86.2	66	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	85.2	64	116
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	78.7	62	124
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	84.7	70	112
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	94.4	63	113
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	87.2	59	123
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	89.9	54	114
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	98.9	53	127
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	81.2	61	121
EP068B: Organophosphorus Pesticides (OP) (QCLot: 290971)								
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	71.8	44	130
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	89.0	63	125
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	83.9	68	124
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	91.8	69	119
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	86.0	75	1196
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	92.9	77	119
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	104	62	124
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	89.2	70	120
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	93.0	69	119
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	86.2	65	121
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	85.8	74	120
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	83.3	69	125
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	86.9	68	122
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	96.1	70	124
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	25.7	20	48

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 290971) - continued								
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	78.9	67	121
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	84.3	70	124
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	87.6	69	121
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	85.6	61	111231
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 290970)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	85.4	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	85.7	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	94.0	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	91.9	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	91.9	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	94.4	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	109	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	94.9	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	90.2	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	102	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	94.8	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	88.3	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	98.5	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	74.1	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	91.0	63	116
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	98.7	63	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 293371)								
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	77.4	62	113
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	78.1	64	114
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	98.3	64	116
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	70.8	64	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	79.2	63	117
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	68.4	62	119
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	79.8	59	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	84.2	63	115
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	85.5	63	116
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	81.1	61	117
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	93.9	64	118
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.0	64	115
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	78.7	60	118
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.6	50	94
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	87.2	63	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 293371) - continued								
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	95.4	63	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 290969)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	95.8	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	96.4	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	95.7	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 291972)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	95.0	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 290969)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	86.1	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	92.4	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	102	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 291972)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.4	75	127
EP080: BTEXN (QCLot: 291972)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.7	70	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.8	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	90.2	69	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	86.0	70	120
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	91.8	72	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	87.2	69	123

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 294534)							
ES1537260-003	BH1_3.0	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	105	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	113	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	104	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	99.9	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 294533)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 294533) - continued							
ES1537260-001	BH1_0.3	EG035T: Mercury	7439-97-6	5 mg/kg	97.2	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 291000)							
ES1537260-001	BH1_0.3	EP068: 4.4`-DDT	50-29-3	2 mg/kg	85.8	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	94.4	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	85.2	70	130
		EP068: Endrin	72-20-8	2 mg/kg	93.5	70	130
		EP068: gamma-BHC	58-89-9	0.5 mg/kg	89.3	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	91.2	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 291000)							
ES1537260-001	BH1_0.3	EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	97.9	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	96.6	70	130
		EP068: Diazinon	333-41-5	0.5 mg/kg	109	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	95.1	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	92.9	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 290999)							
ES1537260-001	BH1_0.3	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	76.0	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	86.0	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 290997)							
ES1537260-001	BH1_0.3	EP080: C6 - C9 Fraction	----	32.5 mg/kg	88.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 290998)							
ES1537260-001	BH1_0.3	EP071: C10 - C14 Fraction	----	523 mg/kg	95.1	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	104	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	123	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 290997)							
ES1537260-001	BH1_0.3	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	85.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 290998)							
ES1537260-001	BH1_0.3	EP071: >C10 - C16 Fraction	----	860 mg/kg	91.8	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	113	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	113	52	132
EP080: BTEXN (QCLot: 290997)							
ES1537260-001	BH1_0.3	EP080: Benzene	71-43-2	2.5 mg/kg	71.3	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	75.7	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	76.7	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	72.5	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	81.0	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 290997) - continued							
ES1537260-001	BH1_0.3	EP080: Toluene	108-88-3	2.5 mg/kg	76.7	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 293453)							
ES1537209-002	Anonymous	EG005C: Arsenic	7440-38-2	1 mg/L	106	70	130
		EG005C: Cadmium	7440-43-9	0.25 mg/L	95.2	70	130
		EG005C: Lead	7439-92-1	1 mg/L	94.4	70	130
		EG005C: Nickel	7440-02-0	1 mg/L	93.3	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 294748)							
ES1537260-026	QA1	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	107	70	130
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	104	70	130
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	108	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	104	70	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	98.4	70	130
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	104	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	109	70	130
EG035C: Leachable Mercury by FIMS (QCLot: 294967)							
ES1537260-006	BHA_3.0	EG035C: Mercury	7439-97-6	0.01 mg/L	89.0	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 294749)							
ES1537260-025	BH1	EG035F: Mercury	7439-97-6	0.01 mg/L	90.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 291972)							
ES1537259-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	127	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 291972)							
ES1537259-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	126	70	130
EP080: BTEXN (QCLot: 291972)							
ES1537259-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	107	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	102	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	102	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	93.5	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70	130
		EP080: Toluene	108-88-3	25 µg/L	93.8	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1537260**	Page	: 1 of 9
Client	: **SULLIVAN ENVIRONMENTAL SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Telephone	: +61-2-8784 8555
Project	: SES_431	Date Samples Received	: 26-Nov-2015
Site	: ----	Issue Date	: 04-Dec-2015
Sampler	: ----	No. of samples received	: 27
Order number	: ----	No. of samples analysed	: 22

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Method Blanks (MB)					
TCLP for Non & Semivolatile Analytes	0	11	0.00	9.09	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	3	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	6	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA029-F: Excess Acid Neutralising Capacity							
Snap Lock Bag - frozen (EA029)							
BHA_3.0, BH5_1.9, BH6_3.0	**23-Nov-2015**	**03-Dec-2015**	22-Nov-2016	✓	**03-Dec-2015**	02-Mar-2016	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH2_0.5, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**----**	----	----	**26-Nov-2015**	07-Dec-2015	✓
Soil Glass Jar - Unpreserved (EA055-103)							
BH5_0.4, BH6_0.5, QC2, BH7_0.4	**24-Nov-2015**	**----**	----	----	**26-Nov-2015**	08-Dec-2015	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - Separate bag received (EA200)							
BH1_0.3, BHA_0.2, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**----**	----	----	**30-Nov-2015**	21-May-2016	✓
Snap Lock Bag - Subsampled by ALS (EA200)							
BH4_0.4	**23-Nov-2015**	**----**	----	----	**30-Nov-2015**	21-May-2016	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**30-Nov-2015**	21-May-2016	✓	**01-Dec-2015**	21-May-2016	✓
Soil Glass Jar - Unpreserved (EG005T)							
BH5_0.4, BH6_0.5, QC2	**24-Nov-2015**	**30-Nov-2015**	22-May-2016	✓	**01-Dec-2015**	22-May-2016	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**30-Nov-2015**	21-Dec-2015	✓	**02-Dec-2015**	21-Dec-2015	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH5_0.4, BH6_0.5, QC2	**24-Nov-2015**	**30-Nov-2015**	22-Dec-2015	✓	**02-Dec-2015**	22-Dec-2015	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
BH1_0.3, BH2_0.5, BH4_0.4	**23-Nov-2015**	**01-Dec-2015**	07-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP068)							
BH5_0.4, BH6_0.5, BH7_0.4	**24-Nov-2015**	**01-Dec-2015**	08-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**01-Dec-2015**	07-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP071)							
BH5_0.4, BH6_0.5, QC2	**24-Nov-2015**	**01-Dec-2015**	08-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
EP075(SIM)T: PAH Surrogates							
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2	**23-Nov-2015**	**01-Dec-2015**	07-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH5_0.4, BH6_0.5, QC2	**24-Nov-2015**	**01-Dec-2015**	08-Dec-2015	✓	**01-Dec-2015**	10-Jan-2016	✓
EP080S: TPH(V)/BTEX Surrogates							
Soil Glass Jar - Unpreserved (EP080)							
BH1_0.3, BH1_3.0, QC1, BHA_0.2, BHA_3.0, BH3_0.1, BH4_0.4, BH5_1.9, SP1_0.2, SP2_0.2, SP3_0.2, SP4_0.2, TRIP BLANK	**23-Nov-2015**	**26-Nov-2015**	07-Dec-2015	✓	**02-Dec-2015**	07-Dec-2015	✓
Soil Glass Jar - Unpreserved (EP080)							
BH5_0.4, BH6_0.5, QC2	**24-Nov-2015**	**26-Nov-2015**	08-Dec-2015	✓	**02-Dec-2015**	08-Dec-2015	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C)							
BHA_3.0, SP1_0.2	**27-Nov-2015**	**30-Nov-2015**	25-May-2016	✓	**30-Nov-2015**	25-May-2016	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
BH1, QA1	**24-Nov-2015**	**----**	----	----	**01-Dec-2015**	22-May-2016	✓
EG035C: Leachable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035C)							
BHA_3.0, SP1_0.2	**27-Nov-2015**	**----**	----	----	**01-Dec-2015**	25-Dec-2015	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
BH1, QA1	**24-Nov-2015**	**----**	----	----	**03-Dec-2015**	22-Dec-2015	✓
EP068A: Organochlorine Pesticides (OC)							
Amber Glass Bottle - Unpreserved (EP068)							
BH1	**24-Nov-2015**	**27-Nov-2015**	01-Dec-2015	✓	**30-Nov-2015**	06-Jan-2016	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
BH1, QA1	**24-Nov-2015**	**27-Nov-2015**	01-Dec-2015	✓	**27-Nov-2015**	06-Jan-2016	✓
EP075(SIM)T: PAH Surrogates							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH1, QA1	**24-Nov-2015**	**27-Nov-2015**	01-Dec-2015	✓	**28-Nov-2015**	06-Jan-2016	✓
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BHA_3.0, SP1_0.2	**27-Nov-2015**	**30-Nov-2015**	04-Dec-2015	✓	**30-Nov-2015**	09-Jan-2016	✓
EP080S: TPH(V)/BTEX Surrogates							
Amber VOC Vial - Sulfuric Acid (EP080)							
BH1, QA1, TB	**24-Nov-2015**	**27-Nov-2015**	08-Dec-2015	✓	**27-Nov-2015**	08-Dec-2015	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	0	11	**0.00**	**9.09**	×	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Mercury by FIMS	EG035C	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Mercury by FIMS	EG035C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Mercury by FIMS	EG035C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Mercury by FIMS	EG035C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Leachable Metals by ICPAES	EG005C	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	3	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	6	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspension Peroxide Oxidation-Combined Acidity and Sulphate	EA029	SOIL	In house: Referenced to Ahern et al 2004 - a suspension peroxide oxidation method following the 'sulfur trail' by determining the level of 1M KCL extractable sulfur and the sulfur level after oxidation of soil sulphides. The 'acidity trail' is followed by measurement of TAA, TPA and TSA. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055-103	SOIL	In-house. A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Leachable Metals by ICPAES	EG005C	SOIL	In house: referenced to APHA 3120; USEPA SW 846 - 6010: The ICPAES technique ionises leachate sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3)
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Leachable Mercury by FIMS	EG035C	SOIL	In house: referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the TCLP solution. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve.

Analytical Methods	Method	Matrix	Method Descriptions
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45 um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45 um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1537260**

Client	: **SULLIVAN ENVIRONMENTAL SCIENCES**	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	:
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: adam@sullivan-es.com.au	E-mail	:
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: SES_431	Page	: 1 of 3
Order number	: ----	Quote number	: ES2015SULENV0034 (SYBQ-207-15)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 26-Nov-2015 11:20 AM	Issue Date	: 26-Nov-2015
Client Requested Due Date	: 04-Dec-2015	Scheduled Reporting Date	: **04-Dec-2015**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 1.4'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 27 / 22

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **SPOCAS analysis will be conducted by ALS Brisbane.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (14 days), Solid (60 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method *Client sample ID*	Sample Container Received	Preferred Sample Container for Analysis
Asbestos Identification in Soils : EA200		
BH4_0.4	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Sample bag

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - EG005C Leachable Metals by ICPAES	SOIL - EG035C Leachable Mercury by FIMS	SOIL - S-12 OC/OP Pesticides	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1537260-001	[23-Nov-2015]	BH1_0.3		✓	✓			✓	✓
ES1537260-002	[23-Nov-2015]	BH1_1.0	✓						
ES1537260-003	[23-Nov-2015]	BH1_3.0		✓					✓
ES1537260-004	[23-Nov-2015]	QC1		✓					✓
ES1537260-005	[23-Nov-2015]	BHA_0.2		✓	✓				✓
ES1537260-006	[23-Nov-2015]	BHA_3.0		✓		✓	✓		✓
ES1537260-007	[23-Nov-2015]	BH2_0.5		✓				✓	
ES1537260-008	[23-Nov-2015]	BH2_3.0	✓						
ES1537260-009	[23-Nov-2015]	BH3_0.1		✓					✓
ES1537260-010	[23-Nov-2015]	BH3_2.5	✓						
ES1537260-011	[23-Nov-2015]	BH4_0.4		✓	✓			✓	✓
ES1537260-012	[23-Nov-2015]	BH4_3.2	✓						
ES1537260-013	[24-Nov-2015]	BH5_0.4		✓				✓	✓
ES1537260-014	[23-Nov-2015]	BH5_1.9		✓					✓
ES1537260-015	[24-Nov-2015]	BH6_0.5		✓				✓	✓
ES1537260-016	[24-Nov-2015]	QC2		✓					✓
ES1537260-018	[24-Nov-2015]	BH7_0.4		✓				✓	
ES1537260-019	[24-Nov-2015]	BH7_3.3	✓						
ES1537260-020	[23-Nov-2015]	SP1_0.2		✓	✓	✓	✓		✓
ES1537260-021	[23-Nov-2015]	SP2_0.2		✓	✓				✓
ES1537260-022	[23-Nov-2015]	SP3_0.2		✓	✓				✓
ES1537260-023	[23-Nov-2015]	SP4_0.2		✓	✓				✓

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA029 SPOCAS	SOIL - EP075 SIM PAH only SIM - PAH only	SOIL - EP080 BTEXN	SOIL - TCLP TCLP Leach
ES1537260-006	[23-Nov-2015]	BHA_3.0	✓	✓		✓
ES1537260-014	[23-Nov-2015]	BH5_1.9	✓			
ES1537260-017	[23-Nov-2015]	BH6_3.0	✓			
ES1537260-020	[23-Nov-2015]	SP1_0.2		✓		
ES1537260-024	[23-Nov-2015]	TRIP BLANK			✓	

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EP080 BTEXN	WATER - W-12 OC/OP Pesticides	WATER - W-26 TRH/BTEXN/PAH/8 Metals
ES1537260-025	[24-Nov-2015]	BH1		✓	✓
ES1537260-026	[24-Nov-2015]	QA1			✓
ES1537260-027	[24-Nov-2015]	TB	✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ADAM SULLIVAN

- *AU Certificate of Analysis - NATA (COA)	Email	adam@sullivan-es.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	adam@sullivan-es.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	adam@sullivan-es.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	adam@sullivan-es.com.au
- A4 - AU Tax Invoice (INV)	Email	adam@sullivan-es.com.au
- Chain of Custody (CoC) (COC)	Email	adam@sullivan-es.com.au
- EDI Format - XTab (XTAB)	Email	adam@sullivan-es.com.au

ALS. Quote : SYBQ/207/15

CHAIN OF CUSTODY FORM

Sheet 1 of 3

THIS COLUMN FOR LAB USE ONLY

Job Code:

Due Date:

FROM: SULLIVAN environmental sciences
Sullivan Environmental Sciences
PO Box 5248
Turramurra NSW 2074
Ph: 0400 500 264 Email: adam@sullivan-es.com.au

DATE: 25/11/15 TO: ALS Environmental

1.4°C

Project No: SES_431
Project Manager: A. Sullivan
Agreement No:

Sampler(s):
Signature(s):
Checked:

Custody seal intact? YES NO
Sample cold? YES NO

Released by:
Date: 26/11/15 Time:

Received by: Warid
Date: 261116 Time: 11:20

Container Size, Type, Preservative and Analysis

Container Identification

Lab identification	Date	Time	Matrix	Sample Number	Comments
1	23/11/15		Solid	BH1_0.3	
2				BH1_1.0	
3				BH1_3.0	
4				QC1	
5				BH4_0.2	
6				BH4_3.0	
7				BH2_0.5	SPOC bag is frozen
8				BH2_3.0	
9				BH3_0.1	
10				BH[redacted]_0.5	
11				BH4_0.4	
12				BH4_3.2	

Analytes	Total no	Tick required analytes						
		TPH/TRH/BTEXN PAH/8 metals	OC/OP	Asbestos ID	SPOCAS	TCLP - As, Cd, Hg, Ni, Pb, BaP	BTEXN	HOLD
	2	X	X	X				
	1							X
	1	X						
	1	X						
	2	X	[redacted]	X				
	2	X			X	X		
	2		X	[redacted]				
	1							X
	2	X				[redacted]		
	1							X
	1	X	X	X				
	[redacted]							X
TOTAL	17	7	3	3	1	1	0	4

Remarks:

* Container Type and Preservative Codes: P = Neutral Plast... Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric ... reserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle

Courier Job No:

Specify Turnaround Time:

Environmental Division
Sydney
Work Order Reference
ES1537260

Telephone : + 61-2-8784 8555

NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES

ALS Quote: SYBQ/207/15

CHAIN OF CUSTODY FORM

Sheet 2 of 3

THIS COLUMN FOR LAB USE ONLY

Job Code:

Due Date:

Custody seal intact? YES / NO

Sample cold? YES / NO

FROM: SULLIVAN environmental sciences — DATE: 25/11/15 — TO: ALS Environmental

Sullivan Environmental Sciences
PO Box 5248
Turramurra NSW 2074
Ph: 0400 500 264 Email: adam@sullivan-es.com.au

Project No: SES_431
Project Manager: A. Sullivan
Agreement No:
Sampler(s):
Signature(s):
Checked:

Released by: Date: 26/11/15 Time: ----

Received by: Wamid Date: 26/11/15 Time: 11:20

Container Size, Type, Preservative and Analysis

Container Identification

Lab identification	Date	Time	Matrix	Sample Number	Comments	Total no	TPH/TAH/BTEXN PAH/8 metals	OC/OP	Asbestos ID	sPOCAS	TCLP- As, Cd, Hg, Ni, Pb BaP	BTEXN	HOLD
				Size									
				Type*									
				Preservative Code									
				Analytes			TPH/TAH/BTEXN PAH/8 metals	OC/OP	Asbestos ID	sPOCAS	TCLP- As, Cd, Hg, Ni, Pb BaP	BTEXN	HOLD
13	24/11/15		Solid	BH5_0.4		1	X	~~X~~			~~X~~		
14				BH5_1.9	sPOCAS bag is frozen	~~2~~	X			X			
15				BH6_0.5		2	X	X					
16				~~BH6_3.0~~ QC2		1	X						
17				BH6_3.0	sPOCAS bag is frozen	2				X			
18				BH7_0.4		1		X					
19				BH7_3.3		1							X
20	23/11/15			SP1_0.2		2	X		X		X		
21				SP2_0.2		2	X		X				
22				SP3_0.2		2	X		X				
23				SP4_0.2		2	X		X				
24				Trip Blank		1						X	
					TOTAL	19	8	3	4	2	1	1	1

Remarks:

* Container Type and Preservative Codes: P = Neutral Plastic; N = Nitric Acid Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass Bottle; VC = Hydrochloric Acid Preserved Vial; VS = Sulfuric Acid Preserved Vial; BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle

Courier Job No:

Specify Turnaround Time:

NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES

ALS Quote: SYBQ/207/15

CHAIN OF CUSTODY FORM

Sheet 3 of 3

THIS COLUMN FOR LAB USE ONLY

Job Code:

Due Date:

FROM: SULLIVAN environmental sciences DATE: 25/11/15 TO: ALS Environmental

Sullivan Environmental Sciences
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Checked:

Custody seal intact? YES NO
Sample cold? YES NO

Released by:
Date: 26/11/15 Time: - - - -

Received by: Wanid
Date: 261115 Time: 11:20

Container Size, Type, Preservative and Analysis

Container Identification

Size							
Type*							
Preservative Code							
Analytes	TPH/TRH/BTEXN PAH/8 metals	OC/OP	BTEXN				
Total no	4	4	1				
Tick required analytes	X	X	X				

Lab identification	Date	Time	Matrix	Sample Number	Comments
26	24/11/15		Water	BH1	
26	〃		〃	QA1	
27	〃		〃	TB	

Remarks:

TOTAL: 9 | 2 | 1 | 1

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