



REPORT

Preliminary Contamination Assessment, St Leonards South

18-32 Holdsworth Avenue & 21-41 Canberra Avenue

Submitted to:

Silver Pond Investments Pty Ltd ATF Silver Pond Unit Trust

201 Elizabeth Street

Sydney NSW 2000

Submitted by:

Golder Associates Pty Ltd

Level 8, 40 Mount Street, North Sydney, New South Wales 2060, Australia

+61 2 9478 3900

18105360-007-R-Rev0

02 June 2021

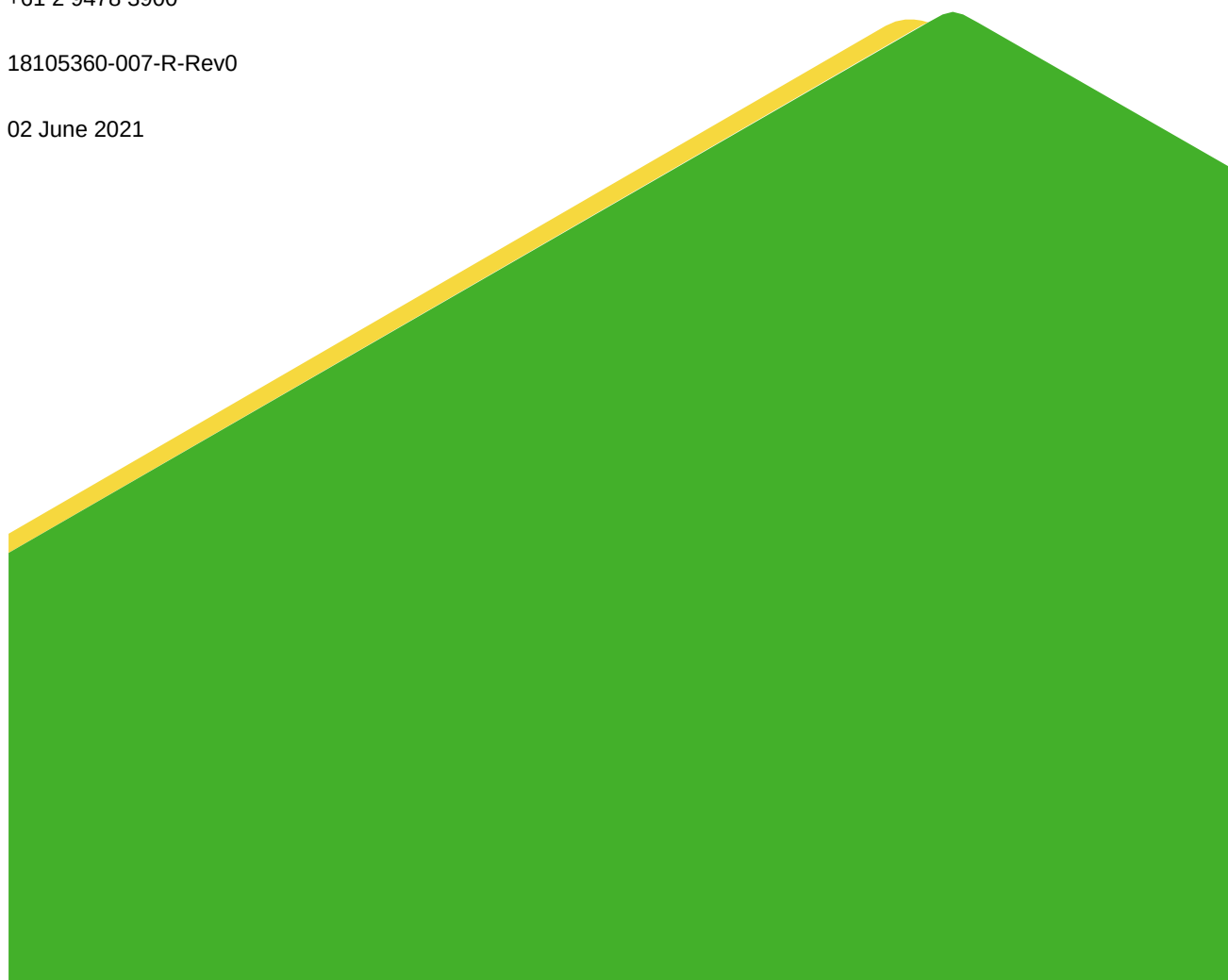


Table of Contents

1.0 INTRODUCTION	1
1.1 Objectives.....	1
1.2 Scope of Work.....	1
2.0 SITE DESCRIPTION	2
2.1 Site Location and Setting	2
2.2 Surrounding Land Use	2
2.3 Site Topography and Surface Drainage.....	2
2.4 Site Geology and Hydrogeology	3
2.4.1 Geology.....	3
2.4.2 Soils and Landscape.....	3
2.4.3 Hydrogeology	3
2.4.4 Acid Sulphate Soils	3
3.0 DESKTOP REVIEW	4
3.1 Historical Aerial Review	4
3.2 Regulatory Searches.....	4
3.2.1 CLM Act Notices	4
3.2.2 Notifications under Section 60 of the CLM Act	4
3.2.3 EPLs under the POEO Act.....	5
4.0 FIELDWORK PROGRAM	6
4.1 Sampling Rationale	6
4.2 Soil Sampling Methodology.....	6
4.3 Groundwater Well Installation and Sampling Methodology	7
4.4 QA/QC Plan.....	7
4.4.1 Field Quality Control Samples	7
4.4.2 Field Quality Control.....	7
4.4.3 Sampling Containers.....	8
4.4.4 Chain of Custody Documentation	8
4.4.5 Data Quality Objectives for Investigation Program	9
4.5 Laboratory Analysis.....	9

4.5.1	Laboratory Quality Control	10
4.5.2	Data Validation	10
5.0	ASSESSMENT CRITERIA.....	11
5.1	Soil Criteria	11
5.1.1	Health Investigation Levels (HILs)	11
5.1.2	Health Screening Levels (HSLs)	11
5.1.3	Management Limits (MLs)	11
5.1.4	Ecological Investigation Levels (EILs)	11
5.1.5	Ecological Screening Levels (ESLs)	12
5.2	Waste Classification Criteria	12
5.3	Groundwater Criteria	12
6.0	INVESTIGATION RESULTS.....	13
6.1	Soil Results	13
6.1.1	Subsurface Conditions	13
6.1.2	Soil Analytical Results	13
6.1.3	Preliminary Waste Classification	14
6.2	Groundwater Results	14
6.2.1	Groundwater Parameters	14
6.2.2	Groundwater Analytical Results	14
7.0	CONCLUSIONS	16
8.0	REFERENCES	17
9.0	LIMITATIONS.....	18

TABLES

Table 1: Site Identification and Setting	2
Table 2: Surrounding Land Use	2
Table 3: Sampling Locations across Stages 1 and 2	6
Table 4: Sample Containers and Holding Times	8
Table 5: Sample Testing Frequency	9
Table 6: Summary analytical results	13
Table 7: Summary analytical results	14

APPENDICES

Figures

Tables

Appendix A

Groundwater Bore Search

Appendix B

Aerial Photographs

Appendix C

EPA Searches

Appendix D

Borehole Logs

Appendix E

Field Records

Appendix F

Calibration Records

Appendix G

Laboratory Certificates

Appendix H

Data Validation

Appendix I

Limitations

1.0 INTRODUCTION

Top Spring Australia Property and Development Services (Top Spring) engaged Golder Associates Pty Ltd (Golder) to undertake a contamination assessment at 18-32 Holdsworth Avenue and 21-41 Canberra Avenue, St Leonards NSW associated with the St Leonards South development site in 2018.

The development site is separated into stages:

- Stage 1: 26-32 Holdsworth Avenue and 27-41 Canberra Avenue which will include three residential towers with basement levels; and
- Stage 2: 18-24 Holdsworth Avenue and 21-25 Canberra Avenue which will include two residential towers with basement levels.

Initially, two separate reports were issued according to the Stages listed above. However, this current revision consolidates the reports, such that the findings and recommendations for both Stages are included in this single report.

1.1 Objectives

Golder understands that Top Spring wish to gain a better understanding of the potential for contamination at the site. The site is proposed to be re-developed from low density residential housing to high density residential including multi-story residential towers with basement levels. The overall main objectives include:

- To identify potential contamination sources and contaminants of concern at the site;
- To provide a preliminary assessment of the potential contamination conditions; and
- To provide a preliminary waste classification of in-situ soils for off-site disposal.

1.2 Scope of Work

The following scope of works was undertaken:

- Completion of a preliminary desktop study of readily available information including:
 - Historical aerial photographs;
 - Published topographical, geological and hydrogeological information of the area, including the regional maps pertaining to the potential for acid sulphate soils; and
 - Environmental registers maintained by the NSW Environment Protection Authority;
- Collection of soil samples from geotechnical drilling locations;
- Laboratory analysis of select soil samples at a commercial laboratory using National Association of Testing Authorities, Australia (NATA) accredited methods;
- Groundwater well development and collection of groundwater samples for analysis at a commercial laboratory using NATA accredited methods;
- Review of soil and groundwater results against adopted screening criteria; and
- Preparation of this report.

2.0 SITE DESCRIPTION

2.1 Site Location and Setting

The site is located at 18-32 Holdsworth Avenue and 21-41 Canberra Avenue, St Leonards, approximately 4.5 km from the Sydney Central Business District. It currently features twelve single dwelling residential properties. **Table 1** summaries the identification and setting of the site.

Table 1: Site Identification and Setting

Item	Details
Street Address	18-32 Holdsworth Avenue and 21-41 Canberra Avenue, St Leonards, NSW
Approximate Area (m ²)	8,350
Current Land Use	Residential
Legal Property Description	Lot 27-34, Section 3, DP 7259 (on Holdsworth Avenue) Lot 15-26, Section 3, DP 7259 (on Canberra Avenue) Lot A & B, DP 411375 Lot A & B, DP 345135
Local Government Area	Lane Cove
Zoning	R4 High Density Residential

2.2 Surrounding Land Use

The site is generally surrounded by residential properties. A summary of the surrounding land uses is included in **Table 2**.

Table 2: Surrounding Land Use

Direction	Description
North	Low density residential housing
East	Newlands Park, followed by followed by apartment buildings and the north shore railway line
South	River Road, followed by low density housing and Greendale Park which includes Berrys Creek
West	Low density residential housing

2.3 Site Topography and Surface Drainage

Stage 1 has a moderate slope to the south, with an elevation of approximately 64 m Australian Height Datum (AHD) in the north-east to 46 mAHD in the south. Stage 2 slopes towards the south to south-east, with elevation between 67 mAHD in the north-east to 55 mAHD in the south-east. Drainage at the site is expected to be connected to the municipal stormwater system and would be expected to drain to the south towards Berrys Creek.

2.4 Site Geology and Hydrogeology

2.4.1 Geology

A review of the 1:100,000 scale Sydney Geological Series Sheet 9130 (DMR 1983) indicates that the site is underlain by Triassic Hawkesbury Sandstone described as medium to coarse grained quartz sandstone with minor shale and laminate lenses.

2.4.2 Soils and Landscape

Based on review of on-line mapping on the eSPADE¹ website residual soil at the site would be part of the Glenorie and Gynea landscape groups.

Soils of the Glenorie soil landscape are typically shallow to moderately deep *Red Podzolic Soils* on crests, moderately deep *Red* and *Brown Podzolic Soils* on upper slopes and deep *Yellow Podzolic Soils* and *Gleyed Podzolic Soils* along drainage lines. Soils of the Glenorie soil landscape have a high erosion hazard, impermeable and highly plastic in localised areas and moderately reactive.

Soils of the Gynea soil landscape are typically shallow to moderately deep *Yellow Earths* and *Earthy Sands* on crests and inside of benches, shallow *Siliceous Sands* on the leading edge of benches, localised *Gleyed Podzolic Soils* and *Yellow Podzolic Soils* on shale lenses, and shallow to moderately deep *Siliceous Sands* and *Leached Sands* along drainage lines. Soils of the Gynea soil landscape are highly permeable, have very low soil fertility, have a high erosion hazard and have rock outcrops.

2.4.3 Hydrogeology

A review of the Department of Primary Industries, Office of Water (DPI) (completed on 4 September 2018) database identified no licensed groundwater bores (wells) within a 500 m radius of the site. The closest groundwater bores are located up-hydraulic gradient of the site and include:

- A domestic bore (GW072478) located approximately 830 m north-west and drilled to 180.5 m; and
- A domestic bore (GW108224) located approximately 840 m north-east and drilled to 132.4 m.

The groundwater bore sheets are included in Appendix A.

Based on the topography and proximity to Berrys Creek (refer to **Section 2.3**), it is anticipated that groundwater at the site flows in a southerly direction.

2.4.4 Acid Sulphate Soils

Acid sulphate soil (ASS) planning sheets associated with the Lane Cove Local Environment Plan 2009 (the LEP) (LCC 2009) did not identify ASS at the site.

On-line ASS mapping hosted by the Australian Soil Resource Information System (ASRIS) was also reviewed. ASRIS shows the site as being in an area of “No Known Occurrence” of ASS.

¹ The data accessible through eSPADE is mainly sourced from the NSW Soil and Land Information System, including soil landscape mapping data.

3.0 DESKTOP REVIEW

3.1 Historical Aerial Review

Historical imagery from 1943 was obtained via SixMaps, and imagery from November 2009 and August 2018 was obtained via Nearmap. Copies of the aerial photographs referenced above are included in Appendix B.

The aerial photograph review identified that single dwelling residential properties were present at the site in 1943, with the property layouts appearing relatively similar to the existing residential properties. The surrounding area also remains largely unchanged with the exception of some low density residential housing to the north, east and south-east which has recently been developed into apartment buildings. Newlands Park, located to the east, generally appears to be unchanged, however, the 1943 aerial appears to indicate some filling or earthworks in the central portion of the park.

3.2 Regulatory Searches

The following on-line records held by the NSW Environment Protection Authority (EPA) were consulted in respect of the site:

- The record of notices issued under the *CLM Act*;
- The public register maintained under Section 308 of the *POEO Act*; and
- The list of sites notified to the EPA under Section 60 of the *CLM Act*.

3.2.1 CLM Act Notices

An on-line search on 4 September 2018 of the EPA's "Record of Notices" issued under the *CLM Act* did not identify the properties within the site as being subject to current or prior notices. A search for sites within the Lane Cove and North Sydney local government areas (LGAs) indicated there were no sites identified as having current or former notices issued under the provisions of the *CLM Act* within 500 m. The search indicated that the closest premises with a current or former notice as located approximately 1.1 km south (down-hydraulic gradient) from the site.

It is considered that the premises identified in the search would have a low potential to impact upon the site. A copy of the results of the notification search is provided in Appendix C.

3.2.2 Notifications under Section 60 of the CLM Act

The NSW EPA maintains a "List of NSW contaminated sites notified to the EPA" under Section 60 of the *CLM Act*. Sites on this list indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. The contamination at the site may or may not be significant enough to warrant regulation by the EPA. The EPA reviews relevant site information before making a determination as to whether or not the site warrants regulation. An on-line search for notified sites in St Leonards and the adjacent suburbs of Wollstonecraft, Waverton, Greenwich, Lane Cove and Crows Nest was performed on 4 September 2018. The search did not identify any sites within 500 m of the site. The search indicated that the closest sites notified under Section 60 of the *CLM Act* include:

- The Gore Creek Reserve Drainage Line near St Vincents Road, Greenwich approximately 800 m south-west (down-hydraulic gradient) of the site;
- The Oyster Cove Gasworks at Kind Street Waverton approximately 1.1 km south (down-hydraulic gradient) of the site; and
- The Caltex Service Station at Falcon Street, Crows Nest approximately 1.1 km east (across-hydraulic gradient) of the site.

It is considered that the premises identified in the search would have a low potential to impact upon the site. A copy of the results of the notification search is provided in Appendix C.

3.2.3 EPLs under the POEO Act

The NSW EPA maintains a public register of premises subject to an Environment Protection Licence (EPL) under the *POEO Act*.

An on-line search for premises in the Lane Cove and North Sydney LGAs was performed on 4 September 2018. The search did not identify any sites within 500 m of the site. The search indicated that the closest sites subject to an EPL include:

- Ramsay Health Care Australia Pty Ltd located at 3 Westbourne Street, St Leonards, approximately 620 m north (up-hydraulic gradient) of the site;
- Hope Healthcare Limited located at 97-115 River Road, Greenwich, approximately 940 m west (across-hydraulic gradient) of the site; and
- St Vincents and Mater Health Sydney Limited located at 25-35 Rocklands Road, North Sydney, approximately 950 m south-east (down-hydraulic gradient) of the site

It is noted that the EPLs subject to the three sites listed above have either been surrendered or are no longer in force. It is considered that the premises would have a low potential to impact upon the site. A copy of the results of the notification search is provided in Appendix C.

4.0 FIELDWORK PROGRAM

4.1 Sampling Rationale

A total of nine boreholes were advanced as part of the geotechnical investigation, including five boreholes within Stage 1 and four boreholes within Stage 2 (refer to **Figure 1**). It is noted that the primary purpose of the investigation was geotechnical, therefore the sample locations and equipment used were specific to the geotechnical scope of works. It is further noted that the minimum sampling density specified in the *NSW EPA Contaminated Sites Sampling Design Guidelines* (1995) is 19 for an area of 0.83 hectares. Given that the objective of the works was to undertake a preliminary assessment of contamination, the required sampling density was not proposed to be met.

The boreholes sampled at the site are listed in **Table 3**. Borehole BH07 was converted to a groundwater monitoring well.

Table 3: Sampling Locations across Stages 1 and 2

Location	Sampling Depth (m)	Comments
BH01	0.5	Sandstone encountered at 0.58 m
BH02	0.8	Natural / residual soils encountered at 0.8 m
BH03	0.95	Natural / residual soils encountered at 0.23 m and sandstone encountered at 1.35 m
BH04	0.1	Sandstone encountered at 0.09 m (directly below concrete slab), sandstone bedrock sampled
BH05	0.0	Hand auger refusal on crushed sandstone at 0.1 m
BH06	0.5	Natural encountered at 0.5 m, no further sampling undertaken
BH07	0.9	Sandstone encountered at 1.2 m
BH08	1.0	Natural / residual soils encountered at 0.75 m
BH09	0.65	Sandstone encountered at 0.8 m

4.2 Soil Sampling Methodology

Fieldwork was completed by Golder Associates geotechnical engineer Stephanie Liew with oversight from environmental scientist Rita Bonetti between 20 August and 4 September 2018. Sampling was carried out using a stainless steel hand auger and trowel in accordance with Golder Associates standard sampling procedures (SOPS).

Soil samples from the boreholes were collected directly from the stainless steel trowel or hand auger at near surface and at 0.5 m depth intervals, where there was a change in soil stratum or at the end of a borehole where drilling could no longer be continued. A new set of disposable Nitrile gloves were used for each sampling interval. Immediately after collection, samples were placed in new glass jars (with Teflon lined lids) and zip lock bags supplied by the laboratory. Samples were stored in a cooler with ice immediately after collection.

Field samples were collected in duplicate. The duplicate samples were sealed in a plastic bag to half its capacity then shaken and allowed to stand for at least 5 minutes. The duplicate sample was then screened

for the presence of volatile organic compounds (VOCs) by inserting the inlet tube of an Ion science “Tiger” (humidity resistant) photoionisation detector (PID), fitted with a 10.6 eV lamp.

4.3 Groundwater Well Installation and Sampling Methodology

The boreholes were drilled and groundwater monitoring wells installed by Nealings Drilling. Groundwater monitoring wells were installed in general accordance with industry standards, including guidance provided in the Minimum Construction Requirements for Water Bores in Australia (NUDLC 2012).

The standpipes in each monitoring bore were constructed using 25 mm diameter Class 18 PVC casing. The annulus between the screen and monitoring bore wall was backfilled with 2 mm river sand, to a height of 0.2 m to 0.5 m above the top of the screened section for each monitoring well. A bentonite seal was then placed above the sand and the well annulus above the bentonite seal was grouted. The wells were completed with a steel ‘gatic’ cover, flush with the ground surface.

Borehole logs were prepared for each monitoring well location showing geology and well construction details. The well construction details are presented on the borehole reports in Appendix D. Golder used differential global positioning system (GPS) survey equipment to locate the monitoring locations and measure the elevation of the ground level and top of well casing to mAHD. Details of the well levels are presented in **Table A** (attached).

Following installation, the wells were developed using dedicated Waterra polyethylene tubing on 3 September 2018 to remove any silt introduced during drilling and for alignment of the gravel pack surrounding the well screens. The groundwater well development records are included in Appendix E.

Sampling of the groundwater monitoring wells was undertaken on 10 September 2018 using a low flow peristaltic pump. Prior to sampling the standing water level was gauged using an electronic interface probe. Water levels are presented in **Table A** (attached).

Groundwater monitoring wells were purged until field parameters stabilised and then sampled. Field parameters (temperature, electrical conductivity, pH, redox potential (using Ag/AgCl electrode), dissolved oxygen, colour, turbidity and odour) were monitored using a calibrated water quality meter. Field parameters are presented in **Table B** (attached) and purging records are provided in Appendix E.

4.4 QA/QC Plan

4.4.1 Field Quality Control Samples

Field Quality Assurance / Quality Control (QA/QC) sampling included the following:

- Field duplicates: Both the primary samples and field duplicate samples generated in the field were sent to the primary laboratory, however the duplicate sample were blind coded. These were targeted for analysis at a frequency of 5% or greater;
- Field triplicates: Individual samples were split in the field and placed in two separate containers. One sample was sent to the primary laboratory and the duplicate sent to an independent check laboratory. These were targeted for analysis at a frequency of 5% or greater;
- Wash blanks or rinsate blanks were collected when non-disposable sampling equipment was used. The rate of laboratory analysis was one per laboratory batch.

4.4.2 Field Quality Control

Standard QA/QC procedures were adopted during the investigation, including those for sample collection, management and handling. Specific requirements included the use of laboratory prepared jars and containers, decontamination of sampling equipment between locations, collection of an appropriate number of

quality control samples, preservation of samples in ice chests and transport to laboratories under chain of custody (COC) documentation.

Decontamination protocols consistent with the methods recommended by *Australian Standard, AS 4482.1-2005 (SA 2005)*, were to be used throughout the soil sampling program to reduce the risk of cross contamination between samples and sample locations. All relevant sampling equipment were decontaminated between samples and sample locations using a phosphate free detergent and a final rinse with potable water.

Calibration of all field measuring equipment such as a PID was carried out by the equipment supplier and the calibration certificates retained by the field scientists. In addition, the equipment was field calibrated daily. Calibration documentation is presented in Appendix F.

4.4.3 Sampling Containers

Samples were placed in appropriate laboratory-supplied sample containers, filled to reduce headspace, labelled and properly sealed and transferred to an ice cooler for transport to the contract laboratory. Samples were cushioned within the shipping coolers by the use of bubble pack wrapping and were kept cool by the use of ice. The types of sample containers are identified in **Table 4** below.

Table 4: Sample Containers and Holding Times

Analyte	Media	Sample container (preservation)	Holding Time
TRH (C ₆ -C ₁₀), BTEXN, VOC	Soil	200 mL glass (cool to < 6°C)	14 days
	Water	2 * 40 mL vial (pH to <2 with HCl or H ₂ SO ₄ , cool to < 6°C)	
TRH (C ₁₀ -C ₄₀), PAHs, OCPs, OPPs and PCBs	Soil	200 mL glass (cool to < 6°C)	14 days
	Water	500 mL amber glass (cool to < 6°C)	7 days
Metals	Soil	200 mL glass (cool to < 6°C)	6 months (28 days for mercury)
	Water	50 mL plastic or glass (field filter, pH to <2 with HNO ₃ , cool to < 6°C)	
Asbestos	Soil	500 mL plastic bag (nil)	Not applicable

4.4.4 Chain of Custody Documentation

A COC record accompanied every sample sent to the laboratory. A copy of this record was kept with the field file and then transferred to the project file when field personnel re-entered the office. The COC records generally contained the following information:

- Sample identification (location and depth);
- Project title/location;
- Date of sampling;
- Sample matrix;
- Signature and name of sampler;
- Number of containers;
- Analysis requested;
- Laboratory used; and

- Specific comments and remarks.

Copies of the signed COC are presented with the laboratory certificates in Appendix G.

4.4.5 Data Quality Objectives for Investigation Program

The data quality objectives (DQOs) for the field work sampling and analysis implemented during the investigation works, to ensure data is valid and complete for the site assessment, included the following:

- The sampling program was aimed at characterising the media in the vicinity of investigation locations;
- The Laboratory Quantitation Limits (LQL) were targeted to be below the adopted criteria where technically possible;
- Sample preservation, storage, and holding time of samples were to be within acceptable limits;
- Field and analytical laboratory sample CoC procedures and documentation were to be complete;
- Analytical results for replicated samples, including field and laboratory duplicates and inter-laboratory duplicates, expressed as Relative Percent Difference (RPD) were to be within the nominated acceptance criteria for field duplicates and splits. *Australian Standard AS4482.1-2005 (SA 2005)* indicates that acceptably precise results are indicated by a RPD of better than 30 to 50 %, but notes that the variation can be expected to be higher for organic analytes than inorganic analytes, and higher where there are low concentrations of analytes. Tiered acceptance criteria have been adopted for assessment of RPDs as follows:
 - Results < 10 times Laboratory Limit of Report (LOR): any RPD acceptable;
 - Results ≥ 10 times and < 20 times LOR: RPD < 50%; and
 - Results ≥ 20 times LOR: RPD < 30%;
- Field wash/rinsate blanks were to be collected to provide evidence that cross-contamination had not occurred during field sampling; and
- Laboratory spikes, controls and surrogates targeted to be within 70% and 130% to demonstrate the reliability of the laboratory results reported.

4.5 Laboratory Analysis

A summary of the soil and groundwater samples (including QA/QC sampling) submitted for laboratory analysis for the site is presented in **Table 5** below. It is noted that the frequency of QA/QC samples analysed was based on the quantity of primary samples collected.

Table 5: Sample Testing Frequency

Parameter	Soil		Groundwater	
	Primary	QA/QC Samples	Primary	QA/QC Samples
Asbestos	8	-	-	-
Metals	14	2	3	2
TRHs	14	2	3	2
BTEXN	14	2	3	2
PAHs	14	2	3	2
OCPs/OPPs	5	2	-	-

Parameter	Soil		Groundwater	
	Primary	QA/QC Samples	Primary	QA/QC Samples
PCB	5	2	-	-
VOCs	-	-	3	2

4.5.1 Laboratory Quality Control

Laboratory analysis was conducted in accordance with the standard test methods outlined in *Schedule B(3) of the NEPM (NEPC 2013)*, *US EPA*, *APHA* or equivalent modified methods supported by adequate quality control. Golder contracted laboratories that are National Association of Testing Authorities (NATA) accredited. As part of Golder's internal quality control, the analytical laboratories used are audited and internal quality control procedures reviewed periodically.

The laboratories contracted by Golder for this investigation were:

- ALS Laboratory Group (ALS) NSW for primary soil and intra laboratory duplicate samples; and
- SGS Environmental for inter-laboratory duplicate samples.

The laboratory certificates, including chain of custody documentation, are presented in Appendix G.

4.5.2 Data Validation

Following completion of the validation field programs, all of the information collected was checked, collated, and summarised in tabular form. The results of all laboratory analyses have been assessed and validated progressively using recognised QA/QC procedures. The primary objective of the data validation process has been to ensure that the data reported can be used to achieve the project objectives.

The validity of all analytical data reported has been assessed by a critical review of the QC check sample results. The validation process is based upon the following data validation guidance documents:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 2013);
- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Data Review* (US EPA, 2010); and
- *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (US EPA, 2008).

Accuracy and precision measurements from the appropriate QA/QC check samples have been compared with the analytical DQOs to assess the quality of the analytical data. Data validation records are presented in Appendix H which describe the variations to the data acceptance criteria. The QA/QC program and quality of the analytical data is considered to be sufficient for environmental interpretative use.

5.0 ASSESSMENT CRITERIA

5.1 Soil Criteria

The human health and ecological based investigation levels documented in *Schedule B1 of the National Environmental Protection (Assessment of Contamination) Measure 1999, as amended 2013 (NEPM, 1999)* have been adopted to screen the soil analytical results. These include the following:

- Health investigation levels (HILs);
- Health screening levels (HSLs);
- Management limits (for Total Petroleum Hydrocarbons);
- Ecological screening levels (ESLs); and
- Ecological investigation levels (EILs).

For the proposed land use, the exposure setting in the NEPM that is considered to be relevant to the site is the high density residential (Level B) land use setting. The criteria are presented in **Table C** (attached).

5.1.1 Health Investigation Levels (HILs)

HILs are generic assessment criteria for a range of inorganic and organic substances designed to be used in the first stage of the assessment of potential risks to human health from chronic exposure to contaminants. The HILs are generic to all soil types and have been developed for a range of land uses.

5.1.2 Health Screening Levels (HSLs)

The NEPM (NEPC, 2013) provides HSLs for petroleum hydrocarbons including F1 (C₆-C₁₀) and F2 (>C₁₀-C₁₆) hydrocarbon fractions and for benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN). HSLs for petroleum hydrocarbons will be used to assess chronic human health risks of petroleum hydrocarbon impact via the vapour intrusion exposure pathway. The HSLs are also considered to be protective of direct contact. Soil HSLs are provided in the NEPM (NEPC, 2013) for a variety of exposure settings based on land use, depth of impact and soil type. The most conservative value (based on sand as the soil type and depth of 0 m to <1 m) has been adopted for screening purposes.

It is noted that the HSLs for TRHs are based on assumed sources of impact being consistent with typical fresh (not weathered or degraded) Australian petrol/diesel fuels.

5.1.3 Management Limits (MLs)

The NEPM (NEPC, 2013) includes 'Management Limits' that are designed to avoid or minimise the potential effects of petroleum hydrocarbons such as formation of observable light non-aqueous phase liquids (LNAPL), fire and explosive hazards and effects on buried infrastructure e.g. penetration of, or damage to, in-ground services by hydrocarbons. The application of the management limits requires consideration of the depth of building basements and services and depth to groundwater.

The NEPM (NEPC, 2013) includes management limits for both coarse and fine grained soils. The most conservative value (coarse grained soils) has been adopted for screening purposes.

5.1.4 Ecological Investigation Levels (EILs)

Generic EILs are provided for lead, arsenic, dichlorodiphenyltrichloroethane (DDT) and naphthalene in the NEPM (NEPC, 2013). The generic EILs are independent of soil type.

Site specific EILs for chromium (III), copper, nickel and zinc can be calculated from the sum of the ambient background concentration (ABC) of the contaminant and on the added contaminant limit (ACL), which is

based on soil specific properties such as pH, cation exchange capacity (CEC) and clay content. The ABC can be determined by measuring the concentration in a soil sample collected at a reference site not impacted by the contaminant. Where a reference site cannot be determined the ABC can be estimated based on urban metal levels as specified in the NEPM (NEPC, 2013).

It is noted that site specific EILs have not been calculated for the site as this project is limited to a preliminary assessment of potential contamination. The NEPM (NEPC, 2013) presents EIL ranges for fresh and aged contamination based on a variety of soil characteristics for chromium (III), copper, nickel and zinc. As such, the lower limit for aged contamination has been adopted.

5.1.5 Ecological Screening Levels (ESLs)

The NEPM (NEPC, 2013) includes ESLs for selected petroleum hydrocarbon compounds and total petroleum hydrocarbon fractions for assessment of risk to terrestrial ecosystems. ESLs are provided for coarse and fine soils, and are relevant to the root zone in soil, corresponding to the top 2 m of the finished level of a site. The most conservative value (coarse grained soils for TRH, benzene, toluene, ethylbenzene and benzo(a)pyrene, and fine grained soils for xylenes) has been adopted for screening purposes.

5.2 Waste Classification Criteria

The soil analytical results have been compared against the NSW EPA Waste Classification Guidelines Part 1: Classifying waste (EPA 2014). Maximum allowable concentrations for expected contaminants for disposal as General Solid Waste (GSW) or Restricted Solid Waste (RSW) are identified in **Table D** (attached). If concentrations exceed the allowable concentrations for selected metals and PAH compounds consideration will be given to performing Toxicity Characteristics Leaching Procedure (TCLP) testing.

Materials disposed off-site which contain asbestos fibres or visible ACM would be classified as a Special Waste, in addition to the appropriate chemical classification.

5.3 Groundwater Criteria

Trigger levels for assessing fresh and marine water quality as outlined in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZAST, 2018) have been adopted to assess groundwater quality. In addition, the following criteria will be considered for the assessment of groundwater:

- Australian Drinking Water Guidelines (ADWG) (NHMRC 2011); and
- Groundwater HSLs for BTEXN specified in the NEPM (NEPC 2013) for typical fuel mixtures. Sand 2 to <4 m values adopted.

The proposed criteria are presented in **Table E** (attached).

6.0 INVESTIGATION RESULTS

6.1 Soil Results

6.1.1 Subsurface Conditions

The stratigraphy of the site is generally described as shallow fill (generally to 0.2 mbgl but up to 1.0 mbgl) comprising sands, clays, silts, and some sandstone cobbles. Natural (residual) soils consisted of sandy clay / clayey sand and clay. Clays were typically medium to high plasticity of very stiff to hard consistency, and the sands generally fine to medium grained. Sandstone bedrock was generally identified underlying natural soils. It is noted that sandstone bedrock was identified immediately below the concrete slab at BH04.

A more detailed description of the soils encountered, samples collected, the qualitative environmental ranking of each sample and the PID readings are recorded on the bore logs presented in Appendix D. Overall there were no significant visual and/or olfactory indicators of potential contamination. However, the following is noted:

- Charcoal and glass fragments were identified at BH02 from 0.5 to 0.8 mbgl;
- Potential sandstone boulders/bricks were identified at BH05;
- A slight sewer odour at BH07; and
- Ceramic fragments were identified at BH08 from 0.6 to 0.75 mbgl.

6.1.2 Soil Analytical Results

Soil analysis results are presented in **Table C** (attached). The tables include a count of samples analysed, minimum and maximum results, and standard deviation for all results reported (including duplicate samples).

A summary of the analytical results is presented below.

Table 6: Summary analytical results

Analyte	Comment
TRH	Concentrations of TRH were lower than the LOR with the exception of TRH >C ₁₆ - C ₃₄ Fraction F3 in the surface sample collected from BH03 (150 mg/kg). The concentration of TRH >C ₁₆ - C ₃₄ Fraction F3 was below the adopted assessment criteria.
BTEXN	Concentrations of BTEXN were lower than the LOR and the adopted assessment criteria.
Heavy Metals	The maximum reported concentrations for heavy metals were below adopted criteria for high density residential land uses with the exception of zinc in surface samples collected from BH03 (140 mg/kg) and BH08 (294 mg/kg) which exceeded the ecological investigation level (70 mg/kg).
PAH	Concentrations of PAHs were below the adopted assessment criteria with the exception of benzo(a)pyrene in the surface sample collected from BH03 (0.7 mg/kg) which equalled the ecological screening levels.
OCP/OPPs	Concentrations of OCPs/OPPs were lower than the LOR with the exception of dieldrin (0.14 mg/kg) and chlordane (0.13 mg/kg) in sample BH06_0.08. Both concentrations were below the adopted assessment criteria.
PCB	Concentrations of PCBs were lower than the LOR and the adopted assessment criteria.

Analyte	Comment
Asbestos	Asbestos (presence/absence) was not detected.

6.1.3 Preliminary Waste Classification

The soil analytical results were screened against the NSW EPA Waste Classification Guidelines Part 1: Classifying waste (EPA 2014) to provide a preliminary waste classification. The soil analysis results and applicable guidelines are presented in **Table D** (attached).

Based on the preliminary screen undertaken, it is considered that material at the site would be classified as General Solid Waste.

Soil excavated during construction works which is not classified as fill material (i.e. residual soils and bedrock) may be classified as Virgin Excavated Natural Material (VENM), however this would need to be confirmed during the planning stages for the excavation works.

If material other than that encountered during the preliminary investigation is observed during excavation works then further assessment may be required.

6.2 Groundwater Results

Groundwater levels were recorded prior to sampling on the 10 September 2017 and are presented in **Table A** (attached). The water level in BH07 in Stage 1 was 45.54 mAHD (1.99 m below top of casing). Based on the groundwater levels observed in Stage 2 (60.36 mAHD in BH02 and 52.81 mAHD in BH04), groundwater flow is likely to be towards the south following topography.

6.2.1 Groundwater Parameters

The field parameters recorded for BH02, BH04 and BH07 are presented in **Table B** (attached). The electrical conductivity was 600 to 870 $\mu\text{S}/\text{cm}$ indicating that water is generally fresh to slightly brackish. The pH was 4.5 to 5.8 indicating that water is slightly acidic. The oxidation reduction potential was 130 to 360 mV indicating mildly to moderately reducing groundwater conditions. Dissolved oxygen was 0.2 to 0.7 ppm and temperatures recorded were 16.4 to 18.1 °C.

During sampling, groundwater in Stage 1 was generally described as clear with low to medium turbidity, whilst the groundwater in Stage 2 was noted as pale brown or clear with low turbidity. Overall, the parameters recorded in the groundwater wells across Stage 1 and 2 were similar.

6.2.2 Groundwater Analytical Results

Groundwater analysis results for BH07 are presented in **Table C** (attached). A summary of the analytical results is presented below.

Table 7: Summary analytical results

Analyte	Comment
TRH	Concentrations of TRH were lower than the LOR with the exception of TRH >C ₁₆ - C ₃₄ Fraction F2 (0.17 mg/L) which exceeded the drinking water criteria (0.1 mg/L) and Fraction F3 (1.06 mg/L) which exceeded the drinking water criteria (0.8 mg/L). It is noted that no registered groundwater bores were identified down-gradient of the site, mains water is readily available and hydraulic conductivity was low in BH07. It is further noted that TRH Fraction F3 was also detected in the up-gradient groundwater wells in BH02 and BH04.

Analyte	Comment
	The presence of low concentrations of TRH in groundwater may be attributed to the drilling fluids used during advancement of the boreholes, and the short time-frame between well installation and sampling. Re-sampling of the groundwater wells would be required to confirm the presence of TRH.
BTEXN	Concentrations of BTEXN were lower than the LOR and the adopted assessment criteria.
Heavy Metals	In Stage 1, the reported concentrations for heavy metals were below adopted criteria with the exception of nickel (12 µg/L) and zinc (34 µg/L) which exceeded the ANZECC 95% freshwater criteria of 11 µg/L and 8 µg/L respectively. For Stage 2, the reported concentrations for heavy metals were below adopted criteria with the exception of copper (22 µg/L), nickel (15 µg/L) and zinc (96 µg/L) in BH02 which exceeded the ANZECC 95% freshwater criteria of 1.4 µg/L, 11 µg/L and 8 µg/L respectively. It is considered that the heavy metals concentrations detected at the site are likely to be representative of regional groundwater quality as significantly elevated metal concentrations in soil or obvious contamination sources were not identified.
PAH	Concentrations of PAHs were lower than the LOR and the adopted assessment criteria.
VOCs	Concentrations of VOCs were lower than the LOR and the adopted assessment criteria.

7.0 CONCLUSIONS

Based on the preliminary contamination assessment undertaken, the following conclusions are made relating to the site:

- The historical aerial photographs indicate that the site has been low density residential since prior to 1943;
- Based on a search of the on-line records held by the NSW Environment Protection Authority (EPA) and surrounding land uses, which are primarily residential, no significant off-site sources of contamination were identified;
- The sub-surface conditions encountered in the geotechnical boreholes were shallow fill material with little or no signs of potential olfactory or visual contamination, underlain by residual sandy clay / clayey sand and sandstone;
- The limited soil samples collected and analysed from geotechnical boreholes indicate that the contaminant concentrations are below the adopted criteria for high density residential land use, with the exception of zinc in surface samples collected from BH03 (140 mg/kg) and BH08 (294 mg/kg) which exceeded the ecological investigation levels (70 mg/kg). However, a comprehensive assessment has not been undertaken;
- The preliminary waste classification indicates that fill material at the site would be classified as General Solid Waste for off-site disposal, however, further testing would be required during development works. Soil excavated during construction works which is not classified as fill material (i.e. residual soils and bedrock) may be classified as Virgin Excavated Natural Material (VENM), however this would need to be confirmed during the planning stages for the excavation works; and
- Groundwater concentrations for BH02 and BH04 were below the adopted criteria with the exception of copper (22 µg/L), nickel (15 µg/L) and zinc (96 µg/L) in BH02 which exceeded the ANZECC 95% freshwater criteria of 1.4 µg/L, 11 µg/L and 8 µg/L respectively, and TRH >C₁₀ - C₁₆ less naphthalene (Fraction F2) (0.17 mg/L) in BH04 which exceeded the drinking water guidelines (0.1 mg/L). Groundwater concentrations for BH07 were below the adopted criteria with the exception of nickel (12 µg/L) and zinc (34 µg/L) which exceeded the ANZECC 95% freshwater criteria of 11 µg/L and 8 µg/L respectively, and TRH >C₁₆ - C₃₄ Fraction F3 (1.06 mg/L) which exceeded the drinking water guidelines (0.8 mg/L).

8.0 REFERENCES

- ANZAST 2018 *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand and Australian State and Territory Governments, August 2018
- ASRIS 2011 *ASRIS – Australian Soil Resource Information System*. <http://www.asris.csiro.au>.
- DMR 1983 *Sydney 1:100 000 Geological Sheet 9130 (Edition 1)*, Geological Survey of New South Wales, Department of Mineral Resources, 1983.
- EPA 1995 *Sampling Design Guidelines*, NSW Environment Protection Authority, September 1995.
- EPA 2014 *Waste Classification Guidelines Part 1: Classifying waste*, NSW Environment Protection Authority, November 2014.
- eSPADE 2016 *eSPADE Online Soil Mapping Tool*. NSW Soil and Land Information System. <http://www.environment.nsw.gov.au/eSpadeWebApp/>.
- LCC 2009 *Lane Cove Local Environmental Plan 2009*, Lane Cove City Council
- NHMRC 2011 *Australian Drinking Water Guidelines 6 2011, National Water Quality Management Strategy*, National Health and Medical Research Council and Natural Resource Management Ministerial Council Version 3.4 Updated (updated October 2017).
- NEPC 2013 *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council, 2013.
- NUDLC 2012 *Minimum Construction Requirements for Water Bores in Australia Third Edition*, National Uniform Drillers Licensing Committee, 2012.
- SA 2005 *AS 4482.1-2005: Guide to the investigation and sampling of sites with potentially contaminated soil - Non-volatile and semi-volatile compounds*, Standards Australia, November 2005.
- US EPA 2008 *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, US Environmental Protection Agency, June 2008.
- US EPA 2010 *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*, US Environmental Protection Agency, January 2010.

9.0 LIMITATIONS

Your attention is drawn to the document “Limitations”, which is included in Appendix I of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

Signature Page

Golder Associates Pty Ltd



Andrew Holloway
Principal Environmental Scientist

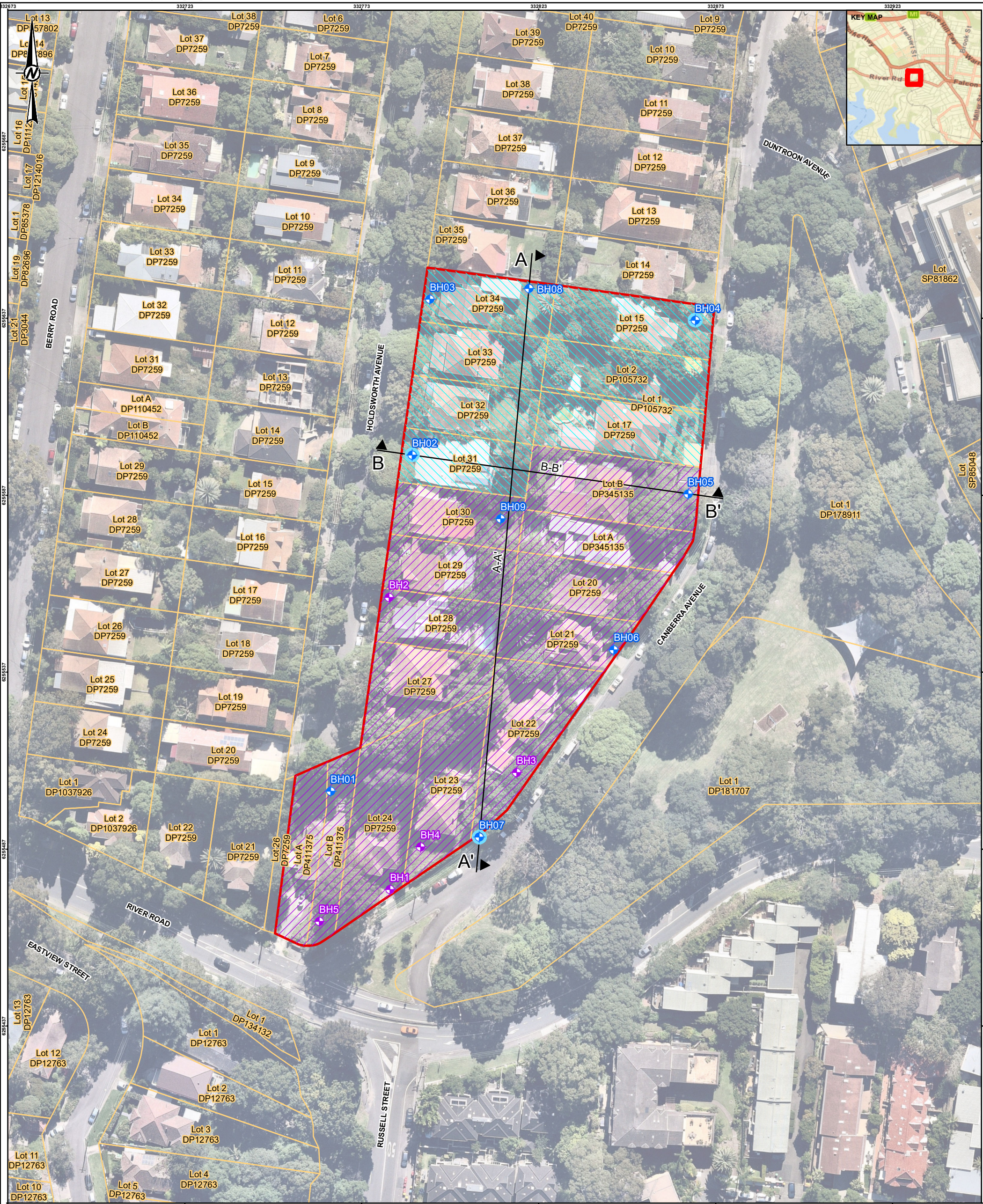
AH/rb

A.B.N. 64 006 107 857

Golder and the G logo are trademarks of Golder Associates Corporation

https://golderassociates-my.sharepoint.com/personal/clindsay_golder_com/documents/desktop/18105360-007-r-rev0_enviro_combined.docx

Figures



LEGEND

- Borehole
- MW
- Asset Geotechnical Locations
- Site Area
- Lot
- Contamination Areas**
- Stage 1
- Stage 2

NOTE(S)

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 56

REFERENCE(S)

SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY LATEST NEARMAP (C) IMAGERY

PROJECT

ST LEONARDS DEVELOPMENT

TITLE

LIMITED CONTAMINATION ASSESSMENT

CLIENT

SILVER POND INVESTMENTS PTY LTD ATF SILVER POND UNIT TRUST

CONSULTANT

GOLDER
MEMBER OF WSP

DD-MM-YYYY

04/06/2021

DESIGNED

JEC

PREPARED

RP

REVIEWED

CF

APPROVED

CF

18105360

18105360

CONTROL

007-R

REV.

A

FIGURE

F0003

Tables

Area	Well Location	Date of Gauging	Gauged Well Depth (mbtoc)	TOC (mAHD)	Ground Level (mAHD)	Well Finish	SWL (mbtoc)	Groundwater Elevation (mAHD)
Stage 2	BH02	10/09/2018	7.095	63.745	64.061	Gatic	3.39	60.355
	BH04	10/09/2018	8.100	58.012	58.031	Gatic	5.20	52.812
Stage 1	BH07	10/09/2018	5.910	47.525	47.623	Gatic	1.99	45.535

Notes:

mbtoc = metres below top of casing

TOC = Top of Casing

SWL= Standing Water Level

mAHD= metres in Australian Height Datum

Area	Location	Date Purged	EC (µS/cm)	Temp (°C)	pH	Er - Redox Field (mV)	Eh (mV)*	DO (mg/L)	Comments
Stage 2	BH02	10/09/2018	603.0	18.1	4.45	152.2	357.2	0.69	Pale brown, low turbidity, no odour or sheen
	BH04	10/09/2018	628.0	18.1	5.83	-72.2	132.8	0.27	Clear, low turbidity, no odour or sheen
Stage 1	BH07	10/09/2018	868.0	16.4	5.79	-14.1	190.9	0.22	Clear, low turbidity, no odour or sheen

Notes:

DO = Dissolved Oxygen

EC = Electrical Conductivity

µS/cm = Microsiemens per centimetre

TDS = Total Dissolved Solids (estimated based on EC value multiplied by 0.65)

*Redox Potential (measured with a platinum electrode and silver/silver chloride reference electrode (Er) and converted to Eh by $Eh = Er + 205 \text{ mV}$)

mV = Millivolts

Temp = Temperature

°C = Degree in Celsius

PAGE 1 OF 4

GOLDER ASSOCIATES PTY LTD

Table C - Soil NEPM, 1/06/2021

					Stage 1																		
					Area																		
					Location_Code																		
					Field_ID																		
					Sample_Date																		
					Lab_Report																		
					BH01																		
					BH05																		
					BH06																		
					BH07																		
					BH09																		
					BH01 0.08																		
					BH05 0.0																		
					BH06 0.08																		
					BH06 0.5																		
					BH07 0.15																		
					QCA101																		
					QCB101																		
					BH07 0.9																		
					BH09 0.1																		
					BH09 0.5																		
					27/08/2018																		
					4/09/2018																		
					22/08/2018																		
					22/08/2018																		
					23/08/2018																		
					23/08/2018																		
					23/08/2018																		
					23/08/2018																		
					28/08/2018																		
					28/08/2018																		
					ES1825849																		
					ES1826279																		
					ES1825146																		
					ES1825146																		
					ES1825146																		
					SE183109																		
					ES1825146																		
					ES1825849																		
					ES1825849																		

Data Comments

#1 Mid brown sandy soil.

#2 S.SPOONER

#3 No

					Area	Stage 2															
					Location_Code	BH02		BH03		BH04	BH08										
					Field_ID	BH02_0.5	BH2_0.8	BH03_0.0	BH03_0.95	BH04_0.1	BH08_0.0	BH08_1.0									
					Sample_Date	20/08/2018	20/08/2018	31/08/2018	31/08/2018	21/08/2018	30/08/2018	30/08/2018									
					Lab_Report	ES1825146	ES1825146	ES1826279	ES1826279	ES1825146	ES1825849	ES1825849									
ChemName	output unit	EQL	NEPM 2013 EILs/ESLs- Urban Residential and public open space	NEPM 2013 HIL- Residential B / HSL- Residential A/B	NEPM 2013 Mgmt Limits - Residential, parkland and public open space								Statistical Summary								
													Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)	
Asbestos																					
Asbestos Type	No					1	-	1	-	-	1	-	3	3	1	1	1	1	0	0	
Asbestos (1-Detect or <1-Non-Detect)	No	0.1				0 ^{#3}	-	0 ^{#3}	-	-	0 ^{#3}	-	3	0	<0	ND	0	ND	0	0	
Asbestos Fines	mg/kg	5				No	-	No	-	-	No	-	8	0	ND	ND	0	ND	0	0	
Sample weight (dry)	g	0.01				235	-	442	-	-	142	-	3	3	142	142	442	442	0	0	
Description	--					1 ^{#1}	-	1 ^{#1}	-	-	1 ^{#1}	-	3	3	1	1	1	1	0	0	
APPROVED IDENTIFIER:	--					1 ^{#2}	-	1 ^{#2}	-	-	1 ^{#2}	-	3	3	1	1	1	1	0	0	
Moisture						16.4	21.3	13.7	12.7	11.6	26.9	15.1	7	7	11.6	11.6	26.9	26.9	0	0	
Heavy Metals																					
Arsenic	mg/kg	5	100	500		6	8	<5	<5	<5	<5	<5	7	2	<5	6	8	8	0	0	
Cadmium	mg/kg	1		150		<1	<1	<1	<1	<1	<1	<1	7	0	<1	ND	<1	ND	0	0	
Chromium	mg/kg	2	190	500		12	19	12	7	12	12	17	7	7	7	7	19	19	0	0	
Copper	mg/kg	5	60	30000		8	<5	46	<5	16	60	7	7	5	<5	7	60	60	0	0	
Lead	mg/kg	5	1100	1200		31	25	77	24	<5	228	13	7	6	<5	13	228	228	0	0	
Mercury	mg/kg	0.1		120		<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	7	2	<0.1	0.1	0.1	0.1	0	0	
Nickel	mg/kg	2	30	1200		<2	<2	6	<2	<2	6	<2	7	2	<2	6	6	6	0	0	
Zinc	mg/kg	5	70	60000		16	8	140	7	15	294	<5	7	6	<5	7	294	294	2	2	
TRH - HSL																					
TRH C6 - C10 Fraction F1	mg/kg	10			700	<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	0	0	
TRH C6 - C10 Fraction Less BTEX F1	mg/kg	10	180	45		<10	<10	<10	<10	<10	<10	<10	7	0	<10	ND	<10	ND	0	0	
TRH >C10 - C16 Fraction F2	mg/kg	50	120		1000	<50	<50	<50	<50	<50	<50	<50	7	0	<50	ND	<50	ND	0	0	
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/kg	50		110		<50	<50	<50	<50	<50	<50	<50	7	0	<50	ND	<50	ND	0	0	
TRH >C16 - C34 Fraction F3	mg/kg	100	300		2500	<100	<100	150	<100	<100	<100	<100	7	1	<100	150	150	150	0	0	
TRH >C34 - C40 Fraction F4	mg/kg	100	2800		10000	<100	<100	<100	<100	<100	<100	<100	7	0	<100	ND	<100	ND	0	0	
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/kg	50				<50	<50	150	<50	<50	<50	<50	7	1	<50	150	150	150	0	0	
BTEX																					
Benzene	mg/kg	0.2	50	0.5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	7	0	<0.2	ND	<0.2	ND	0	0	
Toluene	mg/kg	0.5	85	160		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Ethylbenzene	mg/kg	0.5	70	55		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Xylenes (m & p)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Xylene (o)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Xylenes (Sum of total) (Lab Reported)	mg/kg	0.5	45	40		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Total BTEX	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	7	0	<0.2	ND	<0.2	ND	0	0	
PAH																					
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Benz(a)anthracene	mg/kg	0.5				<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.5	0.5	0.5	0	0	
Benzo(a)pyrene	mg/kg	0.5	0.7			<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.7	0.7	0.7	0	0	
Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5				<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.8	0.8	0.8	0	0	
Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5				0.6	0.6	1.1	0.6	0.6	0.6	0.6	7	7	0.6	0.6	1.1	1.1	0	0	
Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5		4		1.2	1.2	1.4	1.2	1.2	1.2	1.2	7	7	1.2	1.2	1.4	1.4	0	0	
Benzo(b)&(j)fluoranthene	mg/kg	0.5				<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.8	0.8	0.8	0	0	
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Chrysene	mg/kg	0.5				<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.6	0.6	0.6	0	0	
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Fluoranthene	mg/kg	0.5				<0.5	<0.5	1.6	<0.5	<0.5	0.9	<0.5	7	2	<0.5	0.9	1.6	1.6	0	0	
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Naphthalene	mg/kg	0.5	170	3		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	7	0	<0.5	ND	<0.5	ND	0	0	
Phenanthrene	mg/kg	0.5				<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	7	1	<0.5	0.7	0.7	0.7	0	0	
Pyrene	mg/kg	0.5				<0.5	<0.5	1.5	<0.5	<0.5	0.9	<0.5	7	2	<0.5	0.9	1.5	1.5	0	0	
PAH (Sum of Common 16 PAHs - Lab Reported)	mg/kg	0.5		400		<0.5	<0.5	6.4	<0.5	<0.5	1.8	<0.5	7	2	<0.5	1.8	6.4	6.4	0	0	
Organochlorine Pesticides																					
a-BHC	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Aldrin	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Dieldrin	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Aldrin & Dieldrin (Sum of total) (Lab Reported)	mg/kg	0.05		10		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
b-BHC	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
cis-Chlordane	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
trans-Chlordane	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Chlordane (Sum of total)	mg/kg	0.05		90		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
d-BHC	mg/kg	0.05																			

					Area Location_Code Field_ID Sample_Date Lab_Report	Stage 2															
						BH02		BH03		BH04	BH08										
						BH02_0.5	BH2_0.8	BH03_0.0	BH03_0.95	BH04_0.1	BH08_0.0	BH08_1.0									
						20/08/2018	20/08/2018	31/08/2018	31/08/2018	21/08/2018	30/08/2018	30/08/2018									
						ES1825146	ES1825146	ES1826279	ES1826279	ES1825146	ES1825849	ES1825849									
ChemName	output unit	EQL	NEPM 2013 EILs/ESLs- Urban Residential and public open space	NEPM 2013 HIL- Residential B / HSL- Residential A/B	NEPM 2013 Mgmt Limits - Residential, parkland and public open space	Statistical Summary															
						Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)								
DDE	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
DDT	mg/kg	0.2	180			<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0	
DDT+DDE+DDD (Sum of total) (Lab Reported)	mg/kg	0.05		600		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endosulfan	mg/kg	0.05		400		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endosulfan I	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endosulfan II	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endosulfan sulphate	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endrin	mg/kg	0.05		20		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endrin aldehyde	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Endrin ketone	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
g-BHC	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Heptachlor	mg/kg	0.05		10		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Heptachlor epoxide	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Hexachlorobenzene	mg/kg	0.05		15		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Methoxychlor	mg/kg	0.2		500		<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0	
Organophosphorous Pesticides																					
Azinphos-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Bromophos-ethyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Carbophenothion	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Chlorfenvinphos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Chlorpyriphos	mg/kg	0.05		340		<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Chlorpyriphos-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Demeton-s-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Diazinon	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Dichlorvos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Dimethoate	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Ethion	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Fenamiphos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Fenthion	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Malathion	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Parathion-methyl	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0	
Monocrotophos	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0	
Parathion	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0	
Pirimphos-ethyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Prothiofos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0	
Polychlorinated Biphenyls																					
PCB (Sum of Total-Lab Reported)	mg/kg	0.1		1		<0.1	-	-	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0	

Data Comments
#1 Mid brown sandy soil.
#2 S.SPOONER
#3 No

						Stage 1										Statistical Summary						
			Area																			
			Location_Code	BH01	BH05	BH06		BH07				BH09										
			Field_ID	BH01_0.08	BH05_0.0	BH06_0.08	BH06_0.5	BH07_0.15	BH07_0.9	QCA101	QCB101	BH09_0.1	BH09_0.5									
			Sample_Date	27/08/2018	4/09/2018	22/08/2018	22/08/2018	23/08/2018	23/08/2018	23/08/2018	23/08/2018	28/08/2018	28/08/2018									
			Lab_Report	ES1825849	ES1826279	ES1825146	ES1825146	ES1825146	ES1825146	ES1825146	SE183109	ES1825849	ES1825849									
ChemName	output unit	EQL	CT1 General Solid Waste (NSW)	SCC1^^ General Solid Waste (NSW)	CT2 Restricted Solid Waste (NSW)											Number of Results	Number of Detects	Minimum Concentration	Minumum Detect	Maximum Concentration	Maximium Detect	Number of Guideline Exceedances
Asbestos																						
Asbestos Type	No					1	1	1	-	1	-	-	-	1	-	5	5	1	1	1	1	0
Asbestos (1-Detect or <1-Non-Detect)	No	0.1				0 ^{#3}	0 ^{#3}	0 ^{#3}	-	0 ^{#3}	-	-	-	0 ^{#3}	-	5	0	<0	ND	0	ND	0
Asbestos Fines	mg/kg	5				No	No	No	-	No	-	-	-	No	-	8	0	99999	ND	0	ND	0
Sample weight (dry)	g	0.01				524	404	514	-	366	-	-	-	320	-	5	5	320	320	524	524	0
Description	--					1 ^{#1}	1 ^{#1}	1 ^{#1}	-	1 ^{#1}	-	-	-	1 ^{#1}	-	5	5	1	1	1	1	0
APPROVED IDENTIFIER:	--					1 ^{#2}	1 ^{#2}	1 ^{#2}	-	1 ^{#2}	-	-	-	1 ^{#2}	-	5	5	1	1	1	1	0
Moisture																						
Moisture	%	1				8.4	17.2	5.9	15.6	7.1	12.8	6.8	5.9	-	16.1	9	9	5.9	5.9	17.2	17.2	0
Heavy Metals																						
Arsenic	mg/kg	5	100		400	8	<5	<5	12	<5	<5	<5	1	-	18	9	4	1	1	18	18	0
Cadmium	mg/kg	1	20		80	<1	<1	<1	<1	<1	<1	<0.3	-	<1		9	0	<0.3	ND	<1	ND	0
Chromium	mg/kg	2	100		400	12	6	5	20	5	2	6	5.1	-	11	9	9	2	2	20	20	0
Copper	mg/kg	5				10	8	<5	<5	5	<5	<5	3.1	-	11	9	5	3.1	3.1	11	11	0
Lead	mg/kg	5	100	1500	400	9	29	15	8	11	<5	17	11	-	19	9	8	<5	8	29	29	0
Lead Leachate	mg/L	0.1		5	20	-	-	-	-	-	-	-	-	-	-	0	0	99999	ND	0	ND	0
Mercury	mg/kg	0.1	4		16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	-	<0.1	9	0	<0.05	ND	<0.1	ND	0
Nickel	mg/kg	2	40		160	6	<2	2	<2	<2	<2	<2	<0.5	-	<2	9	2	<0.5	2	6	6	0
Zinc	mg/kg	5				44	40	30	<5	11	<5	13	9	-	33	9	7	<5	9	44	44	0
TPH Group - Waste Classification																						
TRH C6 - C9 Fraction	mg/kg	10	650		2600	<10	<10	<10	<10	<10	<10	<10	<20	-	<10	9	0	<10	ND	<20	ND	0
TRH C10 - C14 Fraction	mg/kg	50				<50	<50	<50	<50	<50	<50	<50	<20	-	<50	9	0	<20	ND	<50	ND	0
TRH C15 - C28 Fraction	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	51	-	<100	9	1	51	51	<100	51	0
TRH C29 - C36 Fraction	mg/kg	100				<100	<100	<100	<100	<100	<100	<100	<45	-	<100	9	0	<45	ND	<100	ND	0
TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/kg	50	10000		40000	<50	<50	<50	<50	<50	<50	<50	<110	-	<50	9	0	<50	ND	<110	ND	0
BTEX																						
Benzene	mg/kg	0.2	10		40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	-	<0.2	9	0	<0.1	ND	<0.2	ND	0
Toluene	mg/kg	0.5	288		1152	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Ethylbenzene	mg/kg	0.5	600		2400	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Xylenes (m & p)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	<0.5	9	0	<0.2	ND	<0.5	ND	0
Xylene (o)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Xylenes (Sum of total) (Lab Reported)	mg/kg	0.5	1000		4000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	-	<0.5	9	0	<0.3	ND	<0.5	ND	0
Total BTEX	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.6	-	<0.2	9	0	<0.2	ND	<0.6	ND	0
PAH																						
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benz(a)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benzo(a)pyrene	mg/kg	0.5	0.8		3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	<0.5	9	0	<0.2	ND	<0.5	ND	0
Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5				0.6	0.6	0.6	0.6	0.6	0.6	0.6	-	-	0.6	8	8	0.6	0.6	0.6	0.6	0
Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5				1.2	1.2	1.2	1.2	1.2	1.2	1.2	<0.3	-	1.2	9	8	<0.3	1.2	1.2	1.2	0
Benzo(b)&(j)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Chrysene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Benzo(a)pyrene TEQ (Calculated)	TEQ					-	-	-	-	-	-	-	<0.2	-	-	1	0	<0.2	ND	<0.2	ND	0
Fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Phenanthrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
Pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	<0.5	9	0	<0.1	ND	<0.5	ND	0
PAH (Sum of Common 16 PAHs - Lab Reported)	mg/kg	0.5	200		800	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.8	-	<0.5	9	0	<0.5	ND	<0.8	ND	0
Total PAH (NEPM/WHO 16)	mg/kg	0.8				-	-	-	-	-	-	-	<0.8	-	-	1	0	<0.8	ND	<0.8	ND	0
1-Methylnaphthalene	mg/kg	0.1				-	-	-	-	-	-	-	<0.1	-	-	1	0	<0.1	ND	<0.1	ND	0
2-Methylnaphthalene	mg/kg	0.1				-	-	-	-	-	-	-	<0.1	-	-	1	0	<0.1	ND	<0.1	ND	0
Organochlorine Pesticides																						
2,4-DDT	mg/kg	0.1				-	-	-	-	-	-	-	<0.1	-	-	1	0	<0.1	ND	<0.1	ND	0
a-BHC	mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.1	-	-	6	0	<0.05	ND	<0.1	ND	0
Aldrin	mg/kg	0.05	<50*																			

					Area	Stage 1																										
					Location_Code	BH01		BH05		BH06		BH07				BH09																
					Field_ID	BH01_0.08		BH05_0.0		BH06_0.08		BH06_0.5		BH07_0.15		BH07_0.9		QCA101		QCB101		BH09_0.1		BH09_0.5								
					Sample_Date	27/08/2018		4/09/2018		22/08/2018		22/08/2018		23/08/2018		23/08/2018		23/08/2018		23/08/2018		28/08/2018		28/08/2018								
					Lab_Report	ES1825849		ES1826279		ES1825146		ES1825146		ES1825146		ES1825146		ES1825146		SE183109		ES1825849		ES1825849								
																								Statistical Summary								
ChemName			output unit	EQL	CT1 General Solid Waste (NSW)	SCC1^^ General Solid Waste (NSW)	CT2 Restricted Solid Waste (NSW)																			Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances
gamma-Chlordane			mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0		
trans-Chlordane			mg/kg	0.05	<50*		<50*	<0.05	<0.05	0.07	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	1	<0.05	0.07	0.07	0.07	0	0		
Chlordane (Sum of total)			mg/kg	0.05	<50*		<50*	<0.05	<0.05	0.13	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	1	<0.05	0.13	0.13	0.13	0	0		
d-BHC			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
DDD			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
DDE			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
DDT			mg/kg	0.2	<50*		<50*	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.1	-	-	-	-	6	0	<0.1	ND	<0.2	ND	0	0		
DDT+DDE+DDD (Sum of total) (Lab Reported)			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan			mg/kg	0.05	60		240	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan I			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Endosulfan II			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Endosulfan sulphate			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Endrin			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Endrin aldehyde			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Endrin ketone			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
g-BHC			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Heptachlor			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Heptachlor epoxide			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Hexachlorobenzene			mg/kg	0.05	<50*		<50*	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.1	-	-	-	-	6	0	<0.05	ND	<0.1	ND	0	0		
Isodrin			mg/kg	0.1	<50*		<50*	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		
Methoxychlor			mg/kg	0.2				<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.1	-	-	-	-	6	0	<0.1	ND	<0.2	ND	0	0		
Mirex			mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		
o,p-DDD			mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		
o,p-DDE			mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		
trans-Nonachlor			mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		
Organophosphorous Pesticides																																
Azinphos-methyl			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Bromophos-ethyl			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Carbophenothion			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Chlorfenvinphos			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Chlorpyrifos			mg/kg	0.05	4		16	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Chlorpyrifos-methyl			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Demeton-s-methyl			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Diazinon			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.5	-	-	-	-	6	0	<0.05	ND	<0.5	ND	0	0		
Dichlorvos			mg/kg	0.05	250^		1000^	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.5	-	-	-	-	6	0	<0.05	ND	<0.5	ND	0	0		
Dimethoate			mg/kg	0.05	250^		1000^	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.5	-	-	-	-	6	0	<0.05	ND	<0.5	ND	0	0		
Ethion			mg/kg	0.05	250^		1000^	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Fenamiphos			mg/kg	0.05				<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Fenitrothion			mg/kg	0.2	250^		1000^	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
Fenthion			mg/kg	0.05	250^		1000^	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-	5	0	<0.05	ND	<0.05	ND	0	0		
Malathion			mg/kg	0.05	250^		1000^	<0.05	<0.05	<0.05	-	-	<0.05	-	<0.05	-	<0.05	<0.2	-	-	-	-	6	0	<0.05	ND	<0.2	ND	0	0		
Methidathion			mg/kg	0.5	250^		1000^	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	1	0	<0.5	ND	<0.5	ND	0	0		
Parathion-methyl			mg/kg	0.2	250^		1000^	<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	-	<0.2	-	-	-	-	-	5	0	<0.2	ND	<0.2	ND	0	0		
Monocrotophos			mg/kg	0.2				<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	-	<0.2	-	-	-	-	-	5	0	<0.2	ND	<0.2	ND	0	0		
Parathion			mg/kg	0.2				<0.2	<0.2	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	-	-	6	0	<0.2	ND	<0.2	ND	0	0		

Data Comments

#1 Mid brown sandy soil.
#2 S.SPOONER
#3 No
* Total concentration of scheduled chemicals to be <50mg/kg for CT1 and CT2
^ Total concentration of moderately harmful pesticides to be <250 mg/kg for CT1 and <1000 for CT2.
^^ Criteria included where leachate analysis was undertaken only.

					Area		Stage 2																	
					Location_Code		BH02		BH03		BH04		BH08											
					Field_ID		BH02_0.5	BH2_0.8	BH03_0.0	BH03_0.95	BH04_0.1	BH08_0.0	BH08_1.0											
					Sample_Date		20/08/2018	20/08/2018	31/08/2018	31/08/2018	21/08/2018	30/08/2018	30/08/2018											
					Lab_Report		ES1825146	ES1825146	ES1826279	ES1826279	ES1825146	ES1825849	ES1825849											
													Statistical Summary											
ChemName	output unit	EQL	CT1 General Soild Waste (NSW)	SCC1^^ General Soild Waste (NSW)	CT2 Restricted Solid Waste (NSW)							Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances	Number of Guideline Exceedances					
Asbestos																								
Asbestos Type	No					1	-	1	-	-	-	1	-	3	3	1	1	1	1	0	0			
Asbestos (1-Detect or <1-Non-Detect)	No	0.1				0 ^{#3}	-	0 ^{#3}	-	-	-	0 ^{#3}	-	3	0	<0	ND	0	ND	0	0			
Asbestos Fines	mg/kg	5				No	-	No	-	-	-	No	-	8	0	ND	ND	0	ND	0	0			
Sample weight (dry)	g	0.01				235	-	442	-	-	-	142	-	3	3	142	142	442	442	0	0			
Description	--					1 ^{#1}	-	1 ^{#1}	-	-	-	1 ^{#1}	-	3	3	1	1	1	1	0	0			
APPROVED IDENTIFIER:	--					1 ^{#2}	-	1 ^{#2}	-	-	-	1 ^{#2}	-	3	3	1	1	1	1	0	0			
Moisture																								
Moisture	%	1				16.4	21.3	13.7	12.7	11.6	26.9	15.1		7	7	11.6	11.6	26.9	26.9	0	0			
Heavy Metals																								
Arsenic	mg/kg	5	100		400	6	8	<5	<5	<5	<5	<5		7	2	<5	6	8	8	0	0			
Cadmium	mg/kg	1	20		80	<1	<1	<1	<1	<1	<1	<1		7	0	<1	ND	<1	ND	0	0			
Chromium	mg/kg	2	100		400	12	19	12	7	12	12	17		7	7	7	7	19	19	0	0			
Copper	mg/kg	5				8	<5	46	<5	16	60	7		7	5	<5	7	60	60	0	0			
Lead	mg/kg	5	100	1500	400	31	25	77	24	<5	228	13		7	6	<5	13	228	228	0	0			
Lead Leachate	mg/L	0.1		5	20	-	-	-	-	-	0.1	-		1	1	0.1	0.1	0.1	0.1	0	0			
Mercury	mg/kg	0.1	4		16	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1		7	2	<0.1	0.1	0.1	0.1	0	0			
Nickel	mg/kg	2	40		160	<2	<2	6	<2	<2	6	<2		7	2	<2	6	6	6	0	0			
Zinc	mg/kg	5				16	8	140	7	15	294	<5		7	6	<5	7	294	294	0	0			
TRH - HSL																								
TRH C6 - C10 Fraction F1	mg/kg	10				<10	<10	<10	<10	<10	<10	<10		7	0	<10	ND	<10	ND	0	0			
TRH C6 - C10 Fraction Less BTEX F1	mg/kg	10				<10	<10	<10	<10	<10	<10	<10		7	0	<10	ND	<10	ND	0	0			
TRH >C10 - C16 Fraction F2	mg/kg	50				<50	<50	<50	<50	<50	<50	<50		7	0	<50	ND	<50	ND	0	0			
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/kg	50				<50	<50	<50	<50	<50	<50	<50		7	0	<50	ND	<50	ND	0	0			
TRH >C16 - C34 Fraction F3	mg/kg	100				<100	<100	150	<100	<100	<100	<100		7	1	<100	150	150	150	0	0			
TRH >C34 - C40 Fraction F4	mg/kg	100				<100	<100	<100	<100	<100	<100	<100		7	0	<100	ND	<100	ND	0	0			
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/kg	50				<50	<50	150	<50	<50	<50	<50		7	1	<50	150	150	150	0	0			
TPH Group - Waste Classification																								
TRH C6 - C9 Fraction	mg/kg	10	650		2600	<10	<10	<10	<10	<10	<10	<10		7	0	<10	ND	<10	ND	0	0			
TRH C10 - C14 Fraction	mg/kg	50				<50	<50	<50	<50	<50	<50	<50		7	0	<50	ND	<50	ND	0	0			
TRH C15 - C28 Fraction	mg/kg	100				<100	<100	<100	<100	<100	<100	<100		7	0	<100	ND	<100	ND	0	0			
TRH C29 - C36 Fraction	mg/kg	100				<100	<100	120	<100	<100	<100	<100		7	1	<100	120	120	120	0	0			
TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/kg	50	10000		40000	<50	<50	120	<50	<50	<50	<50		7	1	<50	120	120	120	0	0			
BTEX																								
Benzene	mg/kg	0.2	10		40	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		7	0	<0.2	ND	<0.2	ND	0	0			
Toluene	mg/kg	0.5	288		1152	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Ethylbenzene	mg/kg	0.5	600		2400	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Xylenes (m & p)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Xylene (o)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Xylenes (Sum of total) (Lab Reported)	mg/kg	0.5	1000		4000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Total BTEX	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		7	0	<0.2	ND	<0.2	ND	0	0			
PAH																								
Acenaphthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Acenaphthylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Benz(a)anthracene	mg/kg	0.5				<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.5	0.5	0.5	0	0			
Benzo(a)pyrene	mg/kg	0.5	0.8		3.2	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.7	0.7	0.7	0	0			
Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5				<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.8	0.8	0.8	0	0			
Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5				0.6	0.6	1.1	0.6	0.6	0.6	0.6		7	7	0.6	0.6	1.1	1.1	0	0			
Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5				1.2	1.2	1.4	1.2	1.2	1.2	1.2		7	7	1.2	1.2	1.4	1.4	0	0			
Benzo(b)&(j)fluoranthene	mg/kg	0.5				<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.8	0.8	0.8	0	0			
Benzo(g,h,i)perylene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Benzo(k)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Chrysene	mg/kg	0.5				<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.6	0.6	0.6	0	0			
Dibenz(a,h)anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Fluoranthene	mg/kg	0.5				<0.5	<0.5	1.6	<0.5	<0.5	0.9	<0.5		7	2	<0.5	0.9	1.6	1.6	0	0			
Fluorene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Naphthalene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		7	0	<0.5	ND	<0.5	ND	0	0			
Phenanthrene	mg/kg	0.5				<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5		7	1	<0.5	0.7	0.7	0.7	0	0			
Pyrene	mg/kg	0.5				<0.5	<0.5	1.5	<0.5	<0.5	0.9	<0.5		7	2	<0.5	0.9	1.5	1.5	0	0			
PAH (Sum of Common 16 PAHs - Lab Reported)	mg/kg	0.5	200		800	<0.5	<0.5	6.4	<0.5	<0.5	1.8	<0.5		7	2	<0.5	1.8	6.4	6.4	0	0			
Organochlorine Pesticides																								
a-BHC	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-		1	0	<0.05	ND	<0.05	ND	0	0			

					Area	Stage 2																
					Location_Code	BH02		BH03		BH04		BH08										
					Field_ID	BH02_0.5	BH2_0.8	BH03_0.0	BH03_0.95	BH04_0.1	BH08_0.0	BH08_1.0										
					Sample_Date	20/08/2018	20/08/2018	31/08/2018	31/08/2018	21/08/2018	30/08/2018	30/08/2018										
					Lab_Report	ES1825146	ES1825146	ES1826279	ES1826279	ES1825146	ES1825849	ES1825849										
														Statistical Summary								
														Number of Results		Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances	Number of Guideline Exceedances
ChemName	output unit	EQL	CT1 General Soild Waste (NSW)	SCC1^^ General Soild Waste (NSW)	CT2 Restricted Solid Waste (NSW)																	
Aldrin	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Dieldrin	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Aldrin & Dieldrin (Sum of total) (Lab Reported)	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
b-BHC	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
cis-Chlordane	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
trans-Chlordane	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Chlordane (Sum of total)	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
d-BHC	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
DDD	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
DDE	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
DDT	mg/kg	0.2	<50*		<50*	<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
DDT+DDE+DDD (Sum of total) (Lab Reported)	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan	mg/kg	0.05	60		240	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan I	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan II	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endosulfan sulphate	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endrin	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endrin aldehyde	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Endrin ketone	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
g-BHC	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Heptachlor	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Heptachlor epoxide	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Hexachlorobenzene	mg/kg	0.05	<50*		<50*	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Methoxychlor	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
Organophosphorous Pesticides																						
Azinphos-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Bromophos-ethyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Carbophenothion	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Chlorfenvinphos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Chlorpyriphos	mg/kg	0.05	4		16	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Chlorpyriphos-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Demeton-s-methyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Diazinon	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Dichlorvos	mg/kg	0.05	250^		1000^	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Dimethoate	mg/kg	0.05	250^		1000^	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Ethion	mg/kg	0.05	250^		1000^	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Fenamiphos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Fenthion	mg/kg	0.05	250^		1000^	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Malathion	mg/kg	0.05	250^		1000^	<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Parathion-methyl	mg/kg	0.2	250^		1000^	<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
Monocrotophos	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
Parathion	mg/kg	0.2				<0.2	-	-	-	-	-	-	1	0	<0.2	ND	<0.2	ND	0	0		
Pirimphos-ethyl	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Prothiofos	mg/kg	0.05				<0.05	-	-	-	-	-	-	1	0	<0.05	ND	<0.05	ND	0	0		
Polychlorinated Biphenyls																						
PCB (Sum of Total-Lab Reported)	mg/kg	0.1	<50		<50	<0.1	-	-	-	-	-	-	1	0	<0.1	ND	<0.1	ND	0	0		

Data Comments

#1 Mid brown sandy soil.

#2 S.SPOONER

#3 No

* Total concentration of scheduled chemicals to be <50mg/kg for CT1 and CT2

^ Total concentration of moderately harmful pesticides to be <250 mg/kg for CT1 and <1000 for CT2.

^^ Criteria included where leachate analysis was undertaken only.

					Location_Code		BH02		BH04		BH07						
					Field_ID		BH02_180910		BH04_180910		QCA200		QCB200		BH07_180910		
					Sampled_Date		10/09/2018		10/09/2018		10/09/2018		10/09/2018		10/09/2018		
					Lab_Report		ES1826717		ES1826717		ES1826717		SE183733		ES1826717		
ChemName	output unit	EQL	ANZECC 2000 Freshwater 95%	Human Health (Aust. Drinking Water Guidelines (NMHRC 2011) & NEPM HSLs (NEPC 2013))	Statistical Summary												
					Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances						
Physical Parameters																	
Electrical Conductivity @ 25°C	µS/cm	1			-	751	-	-	-	996	2	2	751	751	996	996	0
pH (Lab)	pH_Units	0.01			-	6.27	-	-	-	6.06	2	2	6.06	6.06	6.27	6.27	0
Chloride	mg/L	1			-	171	-	-	-	280	2	2	171	171	280	280	0
Sulphate (as SO4) (Filtered)	mg/L	1			-	38	-	-	-	30	2	2	30	30	38	38	0
Bicarbonate Alkalinity (as CaCO3)	mg/L	1			-	79	-	-	-	65	2	2	65	65	79	79	0
Carbonate Alkalinity (as CaCO3)	mg/L	1			-	<1	-	-	-	<1	2	0	<1	ND	<1	ND	0
Hydroxide Alkalinity (as CaCO3)	mg/L	1			-	<1	-	-	-	<1	2	0	<1	ND	<1	ND	0
Total Alkalinity (as CaCO3)	mg/L	1			-	79	-	-	-	65	2	2	65	65	79	79	0
Heavy Metals																	
Arsenic (Filtered)	µg/L	1	13	10	<1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND	0
Cadmium (Filtered)	µg/L	0.1	0.2	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND	0
Chromium (Filtered)	µg/L	1	1	50	<1	<1	1	<1	<1	<1	5	1	<1	1	1	1	0
Copper (Filtered)	µg/L	1	1.4	2000	22	<1	<1	<1	<1	<1	5	1	<1	22	22	22	1
Lead (Filtered)	µg/L	1	3.4	10	1	<1	<1	<1	<1	<1	5	1	<1	1	1	1	0
Mercury (Filtered)	µg/L	0.1	0.06	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND	0
Nickel (Filtered)	µg/L	1	11	20	15	6	6	6	6	12	5	5	6	6	15	15	2
Zinc (Filtered)	µg/L	5	8		96	6	6	7	34		5	5	6	6	96	96	2
TRH - HSL																	
TRH C6 - C10 Fraction F1	mg/L	0.02			<0.02	<0.02	<0.02	<0.05	<0.02		5	0	<0.02	ND	<0.05	ND	0
TRH C6 - C10 Fraction Less BTEX F1	mg/L	0.02		1	<0.02	<0.02	<0.02	<0.05	<0.02		5	0	<0.02	ND	<0.05	ND	0
TRH >C10 - C16 Fraction F2	mg/L	0.1			<0.1	<0.1	<0.1	0.17	<0.1		5	1	<0.1	0.17	0.17	0.17	0
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/L	0.1		0.1	<0.1	<0.1	<0.1	0.17	<0.1		5	1	<0.1	0.17	0.17	0.17	1
TRH >C16 - C34 Fraction F3	mg/L	0.1		0.8	0.23	0.18	0.18	0.58	1.06		5	5	0.18	0.18	1.06	1.06	1
TRH >C34 - C40 Fraction F4	mg/L	0.1		0.8	<0.1	<0.1	<0.1	<0.5	<0.1		5	0	<0.1	ND	<0.5	ND	0
TRH C37 - C40 Fraction	mg/L	0.2			-	-	-	<0.2	-		1	0	<0.2	ND	<0.2	ND	0
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/L	0.1			0.23	0.18	0.18	0.67	1.06		5	5	0.18	0.18	1.06	1.06	0
BTEX																	
Benzene	µg/L	1	950	1	<1	<1	<1	<0.5	<1		5	0	<0.5	ND	<1	ND	0
Toluene	µg/L	2	180	800	<2	<2	<2	<0.5	<2		5	0	<0.5	ND	<2	ND	0
Ethylbenzene	µg/L	2	80	300	<2	<2	<2	<0.5	<2		5	0	<0.5	ND	<2	ND	0
Xylenes (m & p)	µg/L	2	75	600	<2	<2	<2	<1	<2		5	0	<1	ND	<2	ND	0
Xylene (o)	µg/L	2	350	600	<2	<2	<2	<0.5	<2		5	0	<0.5	ND	<2	ND	0
Xylenes (Sum of total) (Lab Reported)	µg/L	2			<2	<2	<2	<1.5	<2		5	0	<1.5	ND	<2	ND	0
Total BTEX	µg/L	1			<1	<1	<1	<3	<1		5	0	<1	ND	<3	ND	0
PAH																	
Acenaphthene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Acenaphthylene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Anthracene	µg/L	1	0.4		<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Benz(a)anthracene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Benzo(a)pyrene	µg/L	0.5	0.2	0.01	<0.5	<0.5	<0.5	<0.1	<0.5		5	0	<0.1	ND	<0.5	ND	0
Benzo(a)pyrene TEQ (lower bound)*	µg/L	0.5			<0.5	<0.5	<0.5	-	<0.5		4	0	<0.5	ND	<0.5	ND	0
Benzo(b)&(j)fluoranthene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Benzo(g,h,i)perylene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Benzo(k)fluoranthene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Chrysene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Dibenz(a,h)anthracene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Fluoranthene	µg/L	1	1		<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Fluorene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Indeno(1,2,3-c,d)pyrene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Naphthalene	µg/L	1	16		<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Phenanthrene	µg/L	1	0.6		<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
Pyrene	µg/L	1			<1	<1	<1	<0.1	<1		5	0	<0.1	ND	<1	ND	0
PAH (Sum of Common 16 PAHs - Lab Reported)	µg/L	0.5			<0.5	<0.5	<0.5	<1	<0.5		5	0	<0.5	ND	<1	ND	0
1-Methylnaphthalene	µg/L	0.1			-	-	-	<0.1	-		1	0	<0.1	ND	<0.1	ND	0
2-Methylnaphthalene	µg/L	0.1			-	-	-	<0.1	-		1	0	<0.1	ND	<0.1	ND	0
Volatile Organic Compounds																	
1,4-Dichlorobenzene	µg/L	5	60	40	<5	<5	<5	<0.3	<5		5	0	<0.3	ND	<5	ND	0
4-Chlorotoluene	µg/L	5			<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
1,2,3-Trichlorobenzene	µg/L	5	3		<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
1,2,4-Trichlorobenzene	µg/L	5	85		<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
1,2-Dichlorobenzene	µg/L	5	160	1500	<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
1,3-Dichlorobenzene	µg/L	5	260		<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
2-Chlorotoluene	µg/L	5			<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0
Bromobenzene	µg/L	5			<5	<5	<5	<0.5	<5		5	0	<0.5	ND	<5	ND	0

			Location_Code	BH02	BH04				BH07							
			Field_ID	BH02_180910	BH04_180910	QCA200	QCB200		BH07_180910							
			Sampled_Date	10/09/2018	10/09/2018	10/09/2018	10/09/2018		10/09/2018							
			Lab_Report	ES1826717	ES1826717	ES1826717	SE183733		ES1826717							
ChemName	output unit	EQL	ANZECC 2000 Freshwater 95%	Human Health (Aust. Drinking Water Guidelines (NMHRC 2011) & NEPM HSLs (NEPC 2013))						Statistical Summary						
				Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Number of Guideline Exceedances						
Chlorobenzene	µg/L	5		300	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2,4-trimethylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,3,5-Trimethylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Isopropylbenzene	µg/L	5	30		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
n-Butylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
n-Propylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
p-Isopropyltoluene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
sec-Butylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Styrene	µg/L	5		30	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
tert-Butylbenzene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Methyl Ethyl Ketone	µg/L	50			<50	<50	<50	<10	<50	5	0	<10	ND	<50	ND	0
2-Hexanone	µg/L	50			<50	<50	<50	<5	<50	5	0	<5	ND	<50	ND	0
Methyl iso-butyl ketone	µg/L	50			<50	<50	<50	<5	<50	5	0	<5	ND	<50	ND	0
Acetone	µg/L	10			-	-	-	<10	-	1	0	<10	ND	<10	ND	0
Acrylonitrile	µg/L	0.5	8		-	-	-	<0.5	-	1	0	<0.5	ND	<0.5	ND	0
Methyl-t-butyl ether	µg/L	2			-	-	-	<2	-	1	0	<2	ND	<2	ND	0
Vinyl acetate	µg/L	50			<50	<50	<50	<10	<50	5	0	<10	ND	<50	ND	0
1,1,1,2-Tetrachloroethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1,2,2-Tetrachloroethane	µg/L	5	400		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1,1-Trichloroethane	µg/L	5	270		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1,2-Trichloroethane	µg/L	5	6500		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2,3-Trichloropropane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2-Dibromo-3-chloropropane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2-Dibromoethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1-Dichloroethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2-Dichloroethane	µg/L	5	1900	3	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1-Dichloroethene	µg/L	5	700	30	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
cis-1,2-Dichloroethene	µg/L	5		60	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
trans-1,2-dichloroethene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,2-Dichloropropane	µg/L	5	900		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,3-Dichloropropane	µg/L	5	1100		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
2,2-Dichloropropane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
1,1-Dichloropropene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
cis-1,3-Dichloropropene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
trans-1,3-dichloropropene	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
2-Nitropropane	µg/L	100			-	-	-	<100	-	1	0	<100	ND	<100	ND	0
cis-1,4-Dichloro-2-butene	µg/L	5			<5	<5	<5	<1	<5	5	0	<1	ND	<5	ND	0
trans-1,4-Dichloro-2-butene	µg/L	5			<5	<5	<5	<1	<5	5	0	<1	ND	<5	ND	0
Allyl chloride	µg/L	2			-	-	-	<2	-	1	0	<2	ND	<2	ND	0
Bromochloromethane	µg/L	0.5			-	-	-	<0.5	-	1	0	<0.5	ND	<0.5	ND	0
Bromodichloromethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Bromoform	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Bromomethane	µg/L	50		1	<50	<50	<50	<10	<50	5	0	<10	ND	<50	ND	0
Carbon disulfide	µg/L	5	20		<5	<5	<5	<2	<5	5	0	<2	ND	<5	ND	0
Carbon tetrachloride	µg/L	5	240	3	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Chlorodibromomethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Chloroethane	µg/L	50			<50	<50	<50	<5	<50	5	0	<5	ND	<50	ND	0
Chloroform	µg/L	5	370		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Chloromethane	µg/L	50			<50	<50	<50	<5	<50	5	0	<5	ND	<50	ND	0
Dibromomethane	µg/L	5			<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Dichlorodifluoromethane	µg/L	50			<50	<50	<50	<5	<50	5	0	<5	ND	<50	ND	0
Dichloromethane	µg/L	5	4000	4	-	-	-	<5	-	1	0	<5	ND	<5	ND	0
Hexachlorobutadiene	µg/L	5		0.7	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Iodomethane	µg/L	5			<5	<5	<5	<5	<5	5	0	<5	ND	<5	ND	0
Pentachloroethane	µg/L	5			<5	<5	<5	-	<5	4	0	<5	ND	<5	ND	0
Trichloroethene	µg/L	5	330		<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Tetrachloroethene	µg/L	5	70	50	<5	<5	<5	<0.5	<5	5	0	<0.5	ND	<5	ND	0
Trichlorofluoromethane	µg/L	50			<50	<50	<50	<1	<50	5	0	<1	ND	<50	ND	0
Vinyl chloride	µg/L	50	100	0.3	<50	<50	<50	<0.3	<50	5	0	<0.3	ND	<50	ND	0
Total VOC	µg/L	10			-	-	-	<10	-	1	0	<10	ND	<10	ND	0

Field_ID	RB100	RB101	RB102	RB103	RB104
Sample_Date	21/08/2018	23/08/2018	27/08/2018	30/08/2018	4/09/2018
Lab_Report	ES1825146	ES1825146	ES1825849	ES1825849	ES1826279

Statistical Summary

ChemName	output unit	EQL						Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect
TRH - HSL													
TRH C6 - C10 Fraction F1	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	5	0	<0.02	ND	<0.02	ND
TRH C6 - C10 Fraction Less BTEX F1	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	5	0	<0.02	ND	<0.02	ND
TRH >C10 - C16 Fraction F2	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TRH >C16 - C34 Fraction F3	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TRH >C34 - C40 Fraction F4	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TPH Group - Waste Classification													
TRH C6 - C9 Fraction	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	5	0	<0.02	ND	<0.02	ND
TRH C10 - C14 Fraction	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	0	<0.05	ND	<0.05	ND
TRH C15 - C28 Fraction	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
TRH C29 - C36 Fraction	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	0	<0.05	ND	<0.05	ND
TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5	0	<0.05	ND	<0.05	ND
BTEX													
Benzene	µg/L	1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND
Toluene	µg/L	2	<2	<2	<2	<2	<2	5	0	<2	ND	<2	ND
Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	5	0	<2	ND	<2	ND
Xylenes (m & p)	µg/L	2	<2	<2	<2	<2	<2	5	0	<2	ND	<2	ND
Xylene (o)	µg/L	2	<2	<2	<2	<2	<2	5	0	<2	ND	<2	ND
Xylenes (Sum of total) (Lab Reported)	µg/L	2	<2	<2	<2	<2	<2	5	0	<2	ND	<2	ND
Total BTEX	µg/L	1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND
Naphthalene	µg/L	1	<5	<5	<5	<5	<5	5	0	<5	ND	<5	ND
Heavy Metals													
Arsenic	µg/L	1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND
Cadmium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
Chromium	µg/L	1	<1	<1	<1	<1	2	5	1	<1	2	2	2
Copper	µg/L	1	<1	<1	<1	<1	3	5	1	<1	3	3	3
Lead	µg/L	1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND
Mercury	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0	<0.1	ND	<0.1	ND
Nickel	µg/L	1	<1	<1	<1	<1	<1	5	0	<1	ND	<1	ND
Zinc	µg/L	5	<5	<5	<5	<5	8	5	1	<5	8	8	8

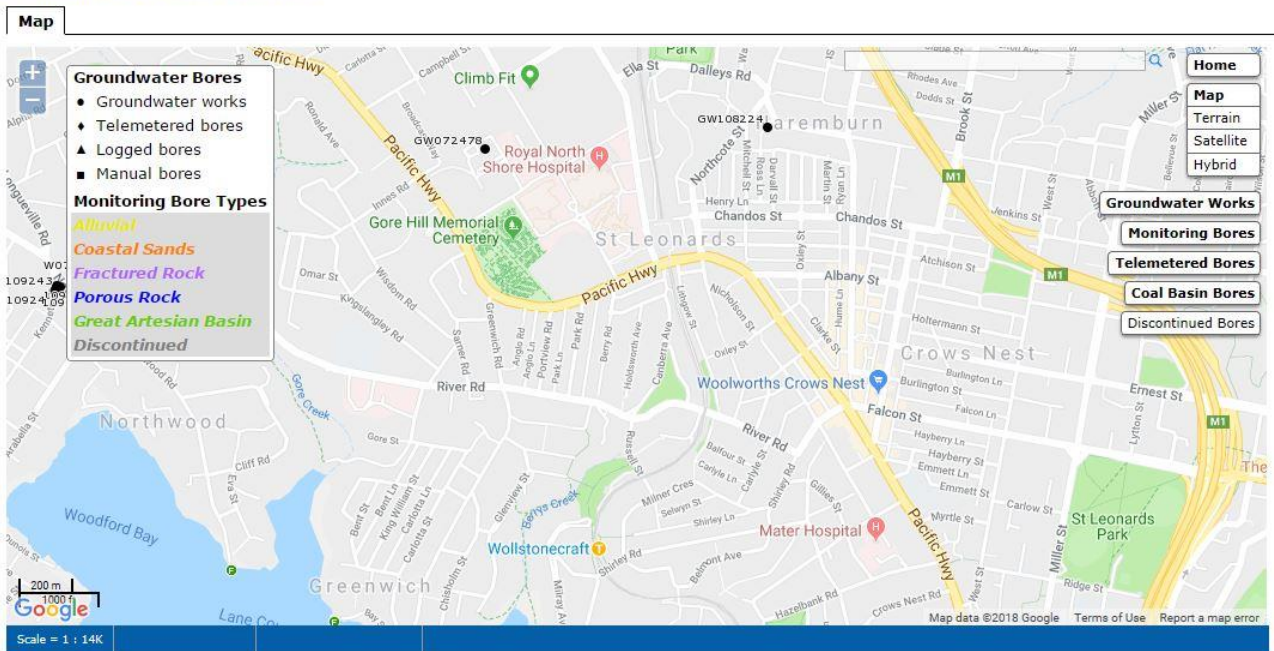
APPENDIX A

Groundwater Bore Search

All Groundwater Site Details » All Groundwater Map

Greater Sydney Region[bookmark this page](#)

All data times are Eastern Standard Time



<https://golderassociates.sharepoint.com/sites/31575g/deliverables/18105360-004-r-rev0-environmental-report-area-a/app-a-groundwater-bore-search/app-a-gw-bores.docx>

NSW Office of Water

Work Summary

GW072478

Licence:

Licence Status:

Authorised Purpose
(s):
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type:

Commenced Date:
Completion Date: 10/01/1995

Final Depth: 180.50 m
Drilled Depth: 180.50 m

Contractor Name: INTERTEC DRILLING
SERVICES
Driller: Richard Auld
Assistant Driller:

Property:

Standing Water Level 48.000
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s): 0.700

Site Details

Site Chosen By:

County
Form A: CUMBE
Licensed:

Parish
CUMBE.57

Cadastre
101/1075748

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:

CMA Map: 9130-3N
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Unknown
Source:

Northing: 6256317.0
Easting: 332277.0

Latitude: 33°49'12.3"S
Longitude: 151°11'15.8"E

GS Map: -

MGA Zone: 0

Coordinate Unidentified
Source: Location

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.40	210			Rotary
1		Hole	Hole	5.40	180.50	158			Rotary
1	1	Casing	Steel	-0.50	5.40	168	158		Driven into Hole

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
29.70	30.10	0.40	Unknown			0.20	30.50		230.00
138.00	139.80	1.80	Unknown			0.30	142.50		270.00

143.80	144.50	0.70	Unknown	48.00	0.20	180.50	270.00
--------	--------	------	---------	-------	------	--------	--------

Geologists Log Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.50	2.50	CONCRETE OVERBURDEN	Overburden	
2.50	5.10	2.60	MOIST CLAY	Clay	
5.10	28.70	23.60	L/G MED. GRAIN SANDSTONE	Sandstone	
28.70	30.10	1.40	LIGHT GREY MED. GRAIN S/STONE QUARTZ MATRIX	Sandstone	
30.10	35.90	5.80	L/GREY GRAIN SANDSTONE	Sandstone	
35.90	37.20	1.30	L/GREY MED GRAIN S/STONE QUARTZ MATRIX	Sandstone	
37.20	45.30	8.10	L/GREY MED GRAIN S/STONE	Sandstone	
45.30	54.30	9.00	DARK GREY SHALE	Shale	
54.30	72.40	18.10	L/GREY CEMENTED S/STONE	Sandstone	
72.40	75.40	3.00	DARK GREY SHALE	Shale	
75.40	109.70	34.30	L/GREY MED GRAIN S/STONE	Sandstone	
109.70	110.60	0.90	QUARTZ LAYER	Quartz	
110.60	121.80	11.20	L/GREY MED GRAIN S/STONE	Sandstone	
121.80	123.30	1.50	DARK GREY SHALE	Shale	
123.30	135.40	12.10	L/GREY MED GRAIN S/STONE	Sandstone	
135.40	138.00	2.60	L/GREY MED GRAIN S/STONE QUARTZ MATRIX	Sandstone	
138.00	139.80	1.80	WATER BEARING QUARTZ	Quartz	
139.80	143.80	4.00	L/GREY MED GRAIN S/STONE QUARTZ MATRIX	Sandstone	
143.80	144.40	0.60	WATER BEARING QUARTZ	Quartz	
144.40	154.10	9.70	L/GREY CEMENTED SANDSTONE	Sandstone	
154.10	163.70	9.60	L/GREY MED GRAIN S/STONE QUARTZ MATRIX	Sandstone	
163.70	166.90	3.20	QUARTZ LAYER	Quartz	
166.90	168.70	1.80	GREY MED GRAIN S/STONE	Sandstone	
168.70	180.50	11.80	L/GREY MED GRAIN SANDSTONE	Sandstone	

Remarks

11/11/2009: Nat Carling, 11-Nov-2009: Updated coordinates as per IPW info, old cadastre was '8//233037'.
19/03/2013: Nat Carling, 19-Mar-2013; Added rock type codes to driller's log & added missing information (based on existing data).

*** End of GW072478 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

NSW Office of Water

Work Summary

GW108224

Licence: 10BL600442

Licence Status: CONVERTED

Authorised Purpose DOMESTIC
(s):
Intended Purpose(s): DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Down Hole Hammer
Owner Type: Private

Commenced Date:
Completion Date: 05/09/2006

Final Depth: 132.40 m
Drilled Depth: 132.40 m

Contractor Name: INTERTEC DRILLING
SERVICES
Driller: Colin Leslie Barden
Assistant Driller:

Property: TINTILLY 1 ROSS LANE
NAREMBURN 2065
GWMA:
GW Zone:

Standing Water Level: 35.000
Salinity:
Yield: 0.300

Site Details

Site Chosen By:

County
Form A: CUMBE
Licensed:

Parish
CUMBE.57

Cadastre
1 306386

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Unknown
Source:

Northing: 6256404.0
Easting: 333214.0

Latitude: 33°49'10.0"S
Longitude: 151°11'52.3"E

GS Map: -

MGA Zone: 0

Coordinate GIS - Geographic
Source: Information System

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	2.50	203			Down Hole Hammer
1		Hole	Hole	2.50	132.40	165			Down Hole Hammer
1		Annulus	Concrete	0.00	2.50	203			
1	1	Casing	Pvc Class 9	-0.40	71.60	140			Suspended in Clamps, Screwed and Glued
1	1	Casing	Steel	-0.40	2.60	165	155		Driven into Hole, Suspended in Clamps

Water Bearing Zones

			WBZ Type						
--	--	--	----------	--	--	--	--	--	--

From (m)	To (m)	Thickness (m)		S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
29.00	35.00	6.00	Unknown			0.10		00:25:00	1750.00
98.00	100.00	2.00	Unknown			0.20		00:05:00	970.00

Geologists Log

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.60	0.60	clay, sandy	Clay	
0.60	2.80	2.20	sandstone, weathered	Sandstone	
2.80	3.10	0.30	clay	Clay	
3.10	25.50	22.40	sandstone, weathered	Sandstone	
25.50	27.00	1.50	sandstone, grey quartz	Sandstone	
27.00	29.00	2.00	shale	Shale	
29.00	35.00	6.00	sandstone, quartz grey	Sandstone	
35.00	41.00	6.00	shale	Shale	
41.00	52.00	11.00	sandstone, grey	Sandstone	
52.00	54.00	2.00	sandstone, quartz grey	Sandstone	
54.00	61.00	7.00	sandstone, grey	Sandstone	
61.00	65.00	4.00	shale	Shale	
65.00	81.00	16.00	sandstone, grey	Sandstone	
81.00	84.00	3.00	sandstone, grey quartz siltstone	Sandstone	
84.00	98.00	14.00	sandstone, grey	Sandstone	
98.00	100.00	2.00	sandstone, grey quartz	Sandstone	
100.00	106.50	6.50	sandstone, grey	Sandstone	
106.50	109.00	2.50	sandstone, dark brown	Sandstone	
109.00	110.50	1.50	sandstone, grey quartz	Sandstone	
110.50	112.00	1.50	siltstone	Siltstone	
112.00	132.40	20.40	sandstone, grey	Sandstone	

Remarks

04/05/2010: updated from original form A

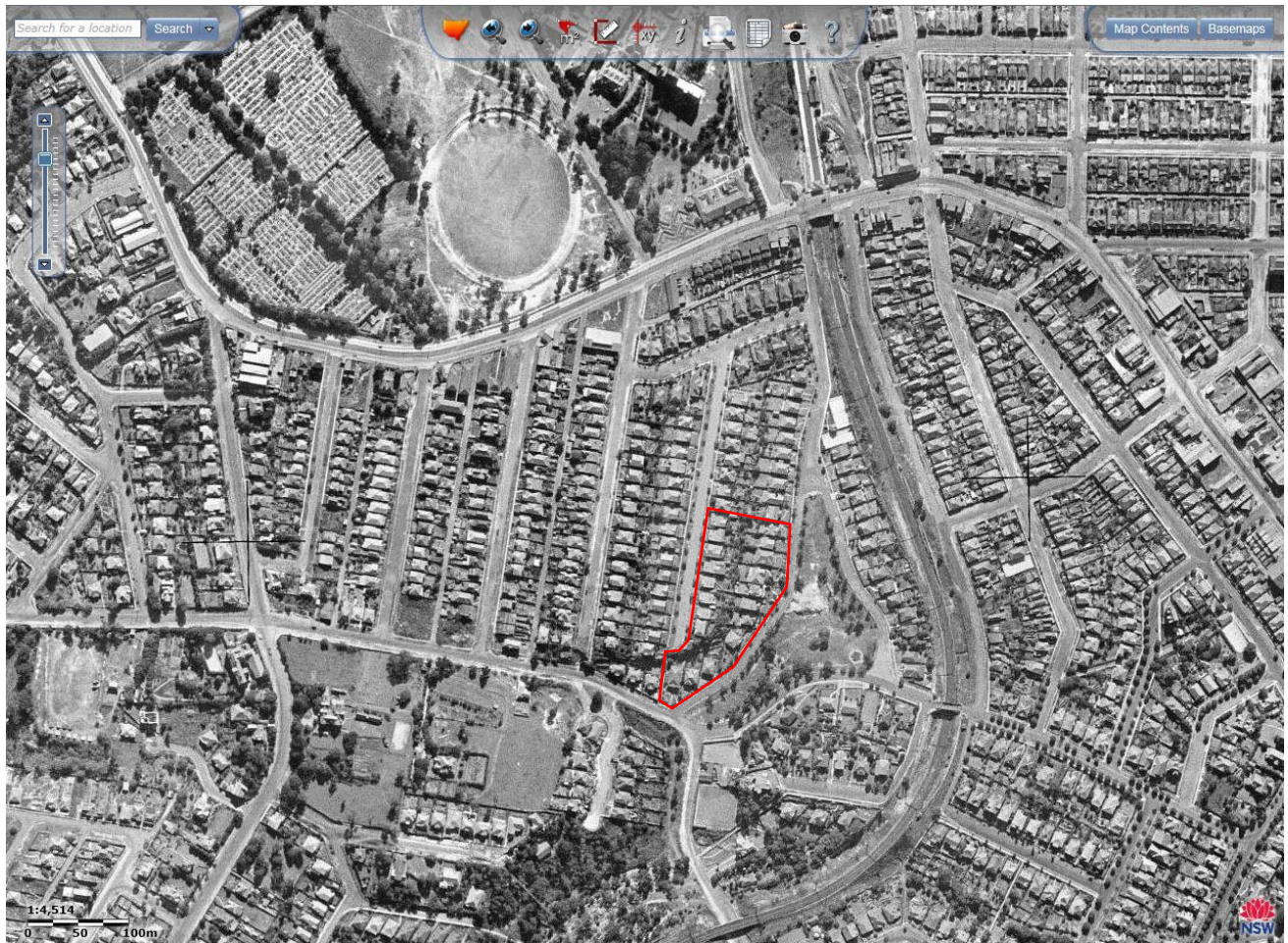
*** End of GW108224 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

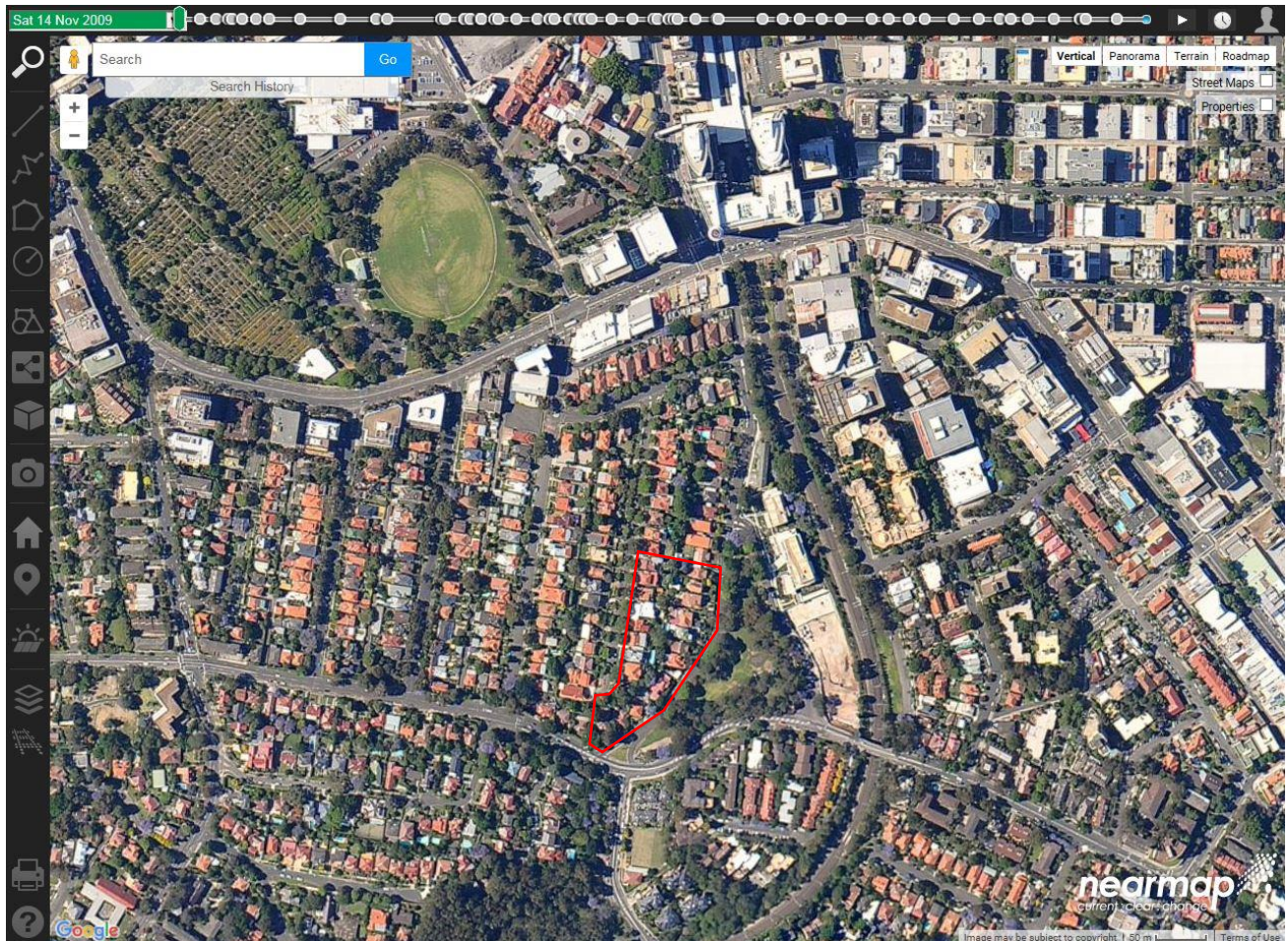
APPENDIX B

Aerial Photographs

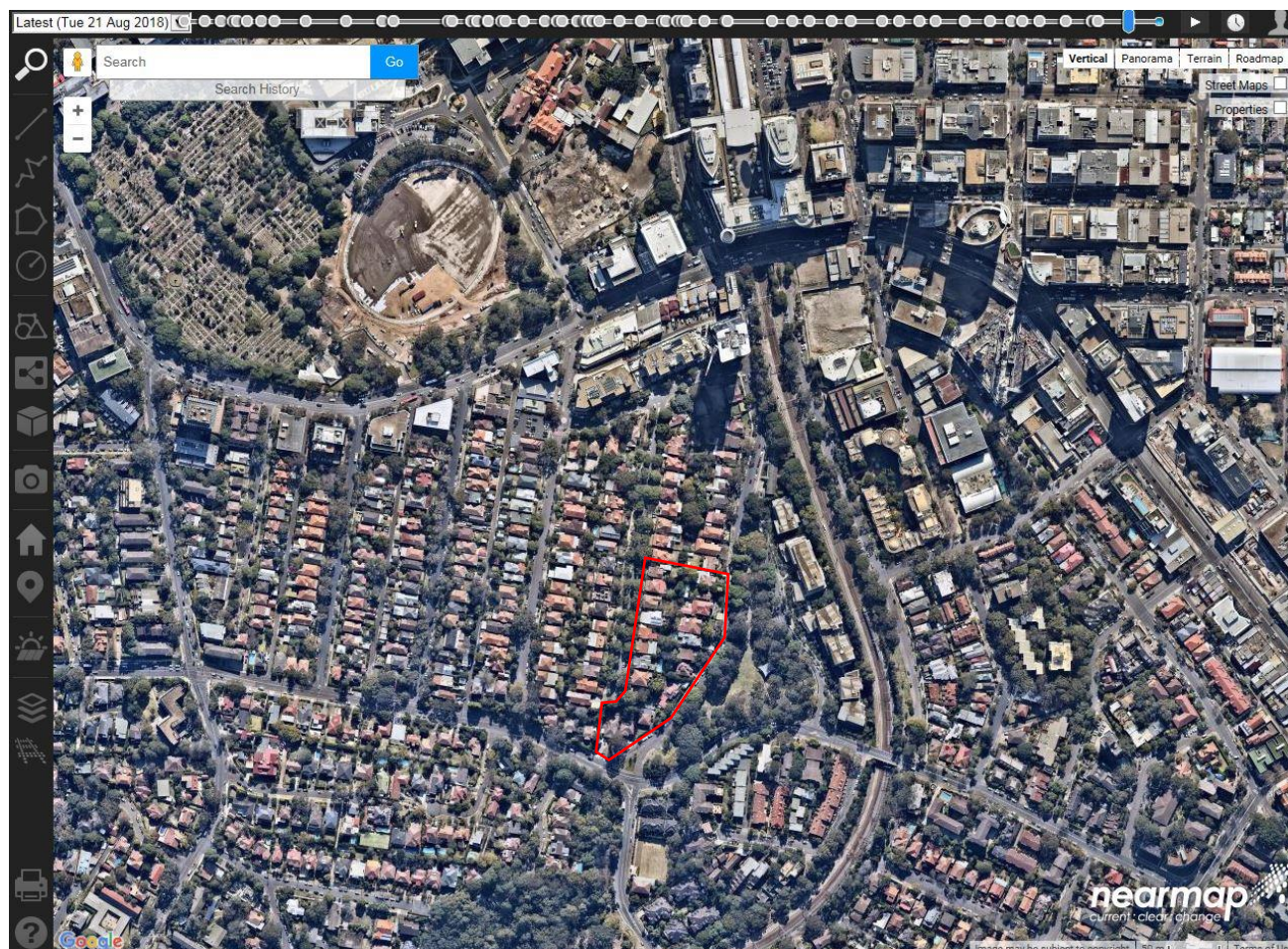
1943



2009



2018



<https://golderassociates.sharepoint.com/sites/31575g/deliverables/18105360-004-r-rev0> - environmental report area a/app b - aerial photos/app b - aerial photographs.docx

APPENDIX C

EPA Searches

CLM ACT RECORD OF NOTICES SEARCH RESULTS

Search results

Your search for: LGA: Lane Cove Council

Matched 14 notices relating to 3 sites.

[Search Again](#) [Refine Search](#)

Suburb	Address	Site Name	Notices related to this site
LANE COVE	Sirius ROAD	Pacific Power	1 current and 8 former
LANE COVE NORTH	432 Pacific HIGHWAY	BP Artarmon Service Station, Lane Cove North	1 current
LANE COVE NORTH	428-432 Mowbray ROAD	Former Caltex Service Station	4 former

Page 1 of 1

4 September 2018

Search results

Your search for: LGA: North Sydney Council

Matched 17 notices relating to 5 sites.

[Search Again](#) [Refine Search](#)

Suburb	Address	Site Name	Notices related to this site
CAMMERAY	Brothers AVENUE	Tunks Park	3 former
NORTH SYDNEY	High STREET	HMAS Platypus Neutral Bay	1 current
NORTH SYDNEY	Adjacent to HMAS Platypus, 118 High STREET	Neutral Bay Sediments	2 former
WAVERTON	2 King STREET	Oyster Cove AGL	1 current and 7 former
WAVERTON	95 Bay ROAD	SRA Land	3 former

Page 1 of 1

4 September 2018

SEARCH RESULTS FOR NOTIFICATIONS UNDER SECTION 60 OF THE CLM ACT

Suburb	Site Name	Site Address	Contamination Activity Type	EPA ManagementClass	Latitude	Longitude
CROWS NEST	Caltex Service Station	111-121 Falcon STREET	Service Station	Regulation under CLM Act not required	-33.82868236	151.2060317
GREENWICH	Gore Creek Reserve - Drainage Line	St Vincents ROAD	Other Industry	Regulation under CLM Act not required	-33.82888693	151.1819101
LANE COVE	Pacific Power	Sirius ROAD	Landfill	Contamination formerly regulated under the CLM Act	-33.80701776	151.1449658
LANE COVE	7-Eleven Service Station	203 Burns Bay ROAD	Service Station	Regulation under CLM Act not required	-33.81458334	151.1543844
LANE COVE	BP-branded Jasbe Service Station	62-70 Epping ROAD	Service Station	Regulation under CLM Act not required	-33.81108427	151.1641531
LANE COVE	Coles Express Service Station Burns Bay	254 Burns Bay ROAD	Service Station	Regulation under CLM Act not required	-33.81719214	151.1518774
WAVERTON	SRA Land	95 Bay ROAD	Unclassified	Contamination formerly regulated under the CLM Act	-33.83716728	151.1969497
WAVERTON	Berry's Bay Woodley's Marina	1 Balls Head DRIVE	Other Industry	Contamination formerly regulated under the POEO Act	-33.84441851	151.1947433
WAVERTON	Oyster Cove AGL	2 King STREET	Gasworks	Ongoing maintenance required to manage residual	-33.83637995	151.193541

POEO ACT ENVIRONMENT PROTECTION LICENCE SEARCH RESULTS

Search results

Your search for: **POEO Licences** with the following criteria

LGA - LANE COVE

returned 7 results

[Export to excel](#)

1 of 1 Pages

[Search Again](#)

Number	Name	Location	Type	Status	Issued date
11801	CAP-XX PTY LTD	9-10/12 MARS ROAD , LANE COVE, NSW 2066	POEO licence	No longer in force	17 Dec 2002
6595	COCHLEAR LIMITED	14 - 16 MARS ROAD, LANE COVE, NSW 2066	POEO licence	No longer in force	01 May 2000
6997	HOPE HEALTHCARE LIMITED	97 - 115 RIVER ROAD, GREENWICH, NSW 2065	POEO licence	Surrendered	07 Sep 2000
6687	INDUSTRIAL & DECORATIVE GOLD PLATING CO PTY LTD	79-81 MARS ROAD, LANE COVE, NSW 2066	POEO licence	No longer in force	11 Sep 2000
6678	MACHIN & EWEN PTY LTD	CNR MARS & SIRIUS ROADS, LANE COVE, NSW 2066	POEO licence	No longer in force	23 Jun 2000
2248	S.C. JOHNSON & SON PTY LTD	160 EPPING ROAD, LANE COVE, NSW 2066	POEO licence	Surrendered	06 Sep 2000
661	VIVA ENERGY AUSTRALIA PTY LTD	MANNS AVENUE, GREENWICH, NSW 2065	POEO licence	Issued	21 Sep 2000

05 September 2018

Search results

Your search for: **POEO Licences** with the following criteria

LGA - NORTH SYDNEY

returned 11 results

[Export to excel](#)

1 of 1 Pages

[Search Again](#)

Number	Name	Location	Type	Status	Issued date
12790	COGENT ENERGY PTY LTD	101-103 Miller Street, NORTH SYDNEY, NSW 2060	POEO licence	Issued	08 Jul 2008
6201	DARKROW PTY LTD	6 HOLT STREET, NORTH SYDNEY, NSW 2060	POEO licence	Surrendered	19 Jan 2000
10893	NOAKES BOAT & SHIPYARDS PTY LIMITED	6 JOHN STREET, MCMAHONS POINT, NSW 2060	POEO licence	Issued	14 Feb 2001
741	NORTH SYDNEY COUNCIL	4 ALFRED STREET, MILSONS POINT, NSW 2061	POEO licence	Surrendered	26 Jun 2000
11170	RAMSAY HEALTH CARE AUSTRALIA PTY LIMITED	3 Westbourne Street, ST LEONARDS, NSW 2065	POEO licence	No longer in force	24 Aug 2000
7512	ROADS & TRAFFIC AUTHORITY OF NEW SOUTH WALES	LOWER FORT STREET, DAWES POINT, NSW 2000	POEO licence	No longer in force	29 Mar 2000
11758	ROYAL SYDNEY YACHT SQUADRON	33 PEEL STREET, KIRRIBILLI, NSW 2061	POEO licence	Issued	28 Nov 2002
6600	ST VINCENTS & MATER HEALTH SYDNEY LIMITED	25 - 35 ROCKLANDS ROAD, NORTH SYDNEY, NSW 2060	POEO licence	No longer in force	19 May 2000
6234	STATE TRANSIT AUTHORITY OF NSW	359 ERNEST STREET, NEUTRAL BAY, NSW 2089	POEO licence	No longer in force	07 Feb 2000
4062	SYDNEY HARBOUR TUNNEL COMPANY LTD	130 MOUNT STREET, NORTH SYDNEY, NSW 2060	POEO licence	Issued	25 Jul 2000
6322	WOODLEYS (BERRYS BAY) PTY LIMITED	1 BALLS HEAD ROAD, WAVERTON, NSW 2060	POEO licence	Surrendered	03 Apr 2000

05 September 2018

<https://golderassociates.sharepoint.com/sites/31575g/deliverables/18105360-004-r-rev0 - environmental report area a/app c - epa searches/app c - epa searches.docx>

APPENDIX D

Borehole Logs



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH1

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 41 Canberra Avenue
JOB NO: 18105360

COORDS: 332764.0 m E 6255503.0 m N MGA94 56
SURFACE RL: 50.50 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.24 m

DRILL RIG: Jackro
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 27/8/18
CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description										
METHOD		PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION			MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	L	M	Groundwater not encountered	0	0.20	DS 0.08 m R = 0A Jar 0.08 m QCA102 Jar 0.08 m QCB102 Jar 0.08 m PID = 0.2 ppm Jar 0.10 m R = 0A PID = 0.1 ppm DS 0.50 m R = 0A Jar 0.50 m PID = 0.1 ppm			SC / CL	Brick pavers			D	MD		FILL POSSIBLE FILL RESIDUAL SOIL
	H			Silty SAND fine to medium grained, sub-angular, brown, with fine to medium grained, sub-angular gravel												
				1						Clayey SAND fine to medium grained, sub-angular, orange brown and grey, low plasticity clay						0.6m: DCP - 18, 30/40mm HB
										Clayey SAND /Sandy CLAY fine to medium grained, orange brown, low plasticity clay						
										For Continuation Refer to Sheet 2						

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01a
RL3



CHECKED: BF DATE: 17/9/18

HOLE DEPTH: 12.24 m

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH1

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 41 Canberra Avenue
JOB NO: 18105360

COORDS: 332764.0 m E 6255503.0 m N MGA94 56
SURFACE RL: 50.50 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.24 m

DRILL RIG: Jackro
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 27/8/18
CHECKED: BF DATE: 17/9/18

Drilling						Field Material Description						Defect Information			
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)			
NMLC	100% RETURN		100 (100)	10			SANDSTONE grey, irregular bedding dipping at 0 to 20 degrees	FR		PLI(D)=1.50 PLI(A)=1.46	10.00 m: HB				
											10.64 m: B, 10°, Pl, Ro, clay Ve 10.75 m: DB				
				11						PLI(D)=1.40 PLI(A)=1.83	11.00 m: HB				
			100 (100)								11.45 m: HB				
				12						PLI(D)=1.61 PLI(A)=1.46	11.79 m: HB				
				12.24	38.26		END OF BOREHOLE @ 12.24 m TARGET DEPTH GROUNDWATER NOT OBSERVED GROUTED				12.00 m: HB 12.03 m: HB				
				13											
				14											
				15											
				16											
				17											
				18											
				19											
				20											

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH2

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 24 Holdsworth Avenue
JOB NO: 18105360

COORDS: 332787.0 m E 6255598.0 m N MGA94 56
SURFACE RL: 64.20 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.24 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 20/8/18
CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description																		
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm											
													0	5	10	15	20	25						
HA	L	Groundwater not encountered	0	64.20	DS 0.00 m				Silty SAND			FILL												
			Jar 0.00 m	fine to medium grained, sub-angular, dark brown, with roots																				
	0.40		R = 1A	orange brown, increasing clay content																				
	0.50		QCA100																					
M			63.70		Jar 0.00 m				CLAY			RESIDUAL SOIL												
		0.80	QCB100	Jar 0.00 m	low to medium plasticity, black and orange brown, with silt, trace fine grained sand, with charcoal and glass fragments																			
			63.40		PID = 0.3 ppm	CH			CLAY	M	VSt													
				DS 0.30-0.30 m	high plasticity, yellow brown																			
				Rec = /0 mm																				
				DS 0.50 m																				
ADT	H				Jar 0.50 m																			
					R = 0A																			
					PID = 0.1 ppm																			
					DS 0.70-0.80 m																			
					Rec = /100 mm																			
					DS 0.80-0.90 m																			
					Rec = /100 mm																			
					Jar 0.80 m																			
					R = 0A																			
					PID = 0.1 ppm																			
					DS 1.90-2.00 m																			
					Rec = /100 mm																			
					SPT 2.00-2.10 m																			
					8/100mm HB N=R																			

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01h
RL3



SHEET: 2 OF 3

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 20/8/18
CHECKED: BF DATE: 17/9/18

NMLC
100% RETURN

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH2

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 24 Holdsworth Avenue
JOB NO: 18105360

COORDS: 332787.0 m E 6255598.0 m N MGA94 56
SURFACE RL: 64.20 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.24 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 20/8/18
CHECKED: BF DATE: 17/9/18

Drilling						Field Material Description						Defect Information			
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)		DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)		
NMLC	100% RETURN	100 (100)	100 (100)	10			SANDSTONE fine to medium grained, grey, indistinct bedding, with less than 1% carbonaceous flecks and laminations	FR		PLI(D)=1.34 PLI(A)=1.40		10.00 m: HB 10.15 m: B, 10°, Pl, Ro, Clay Ct, 3 mm			
				11	11.05 53.15		distinct cross bedding dipping at approximately 5 to 20 degrees, with less than 1% carbonaceous flecks of up to 5mm and laminations			PLI(D)=0.86 PLI(A)=1.02		10.86 m: DB 11.00 m: HB 11.24 m: B, 5-20°, Pl, Ro, Cn			
				12	11.81 52.39		indistinct bedding, with carbonaceous flecks of up to 2mm			PLI(D)=1.46 PLI(A)=1.45		12.00 m: DB			
					12.24 51.96		END OF BOREHOLE @ 12.24 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 3.21 m DEPTH STANDPIPE INSTALLED								
				13											
				14											
				15											
				16											
				17											
				18											
				19											
				20											

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER PRELIMINARY REPORT OF STANDPIPE INSTALLATION: BH2

SHEET: 1 OF 1

CLIENT: Property Development Solutions Group

COORDS: 332787.0 m E 6255598.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 64.20 m DATUM: mAHD

CONTRACTOR: Nealings Drilling Pty Ltd

LOCATION: 24 Holdsworth Avenue

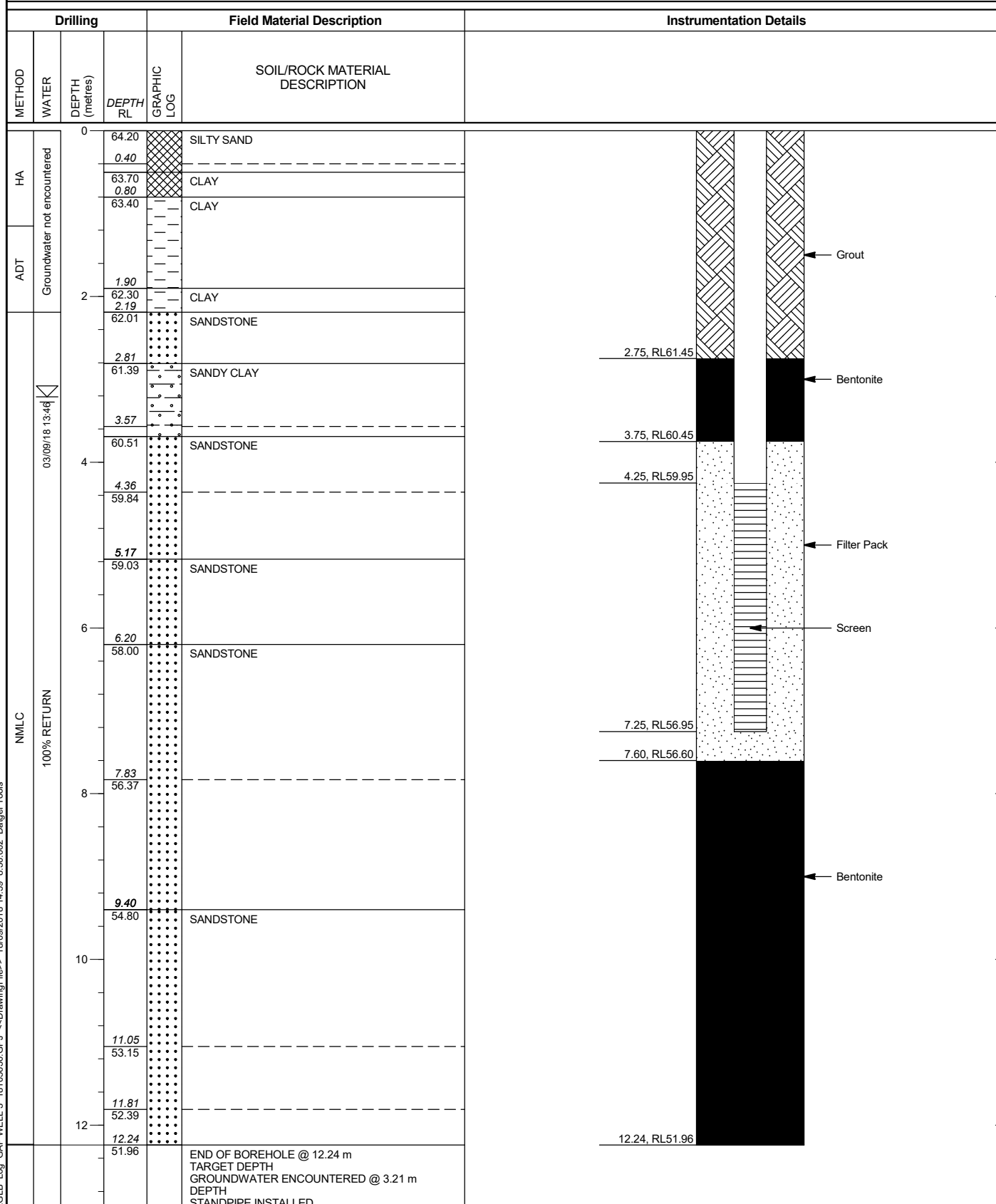
INCLINATION: -90°

LOGGED: SL DATE: 20/8/18

JOB NO: 18105360

HOLE DEPTH: 12.24 m

CHECKED: BF DATE: 17/9/18



This report of standpipe installation must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F17
RL1



SHEET: 1 OF 3

DRILL RIG: Jackro

CONTRACTOR: Nealings Drillings

LOGGED: SL DATE: 31/8/18

CHECKED: BF DATE: 17/9/18

10

GAP gINT FN. F01h
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH3

SHEET: 2 OF 3

DRILL RIG: Jackro

CONTRACTOR: Nealings Drillings

LOGGED: SL DATE: 31/8/18

CHECKED: BF DATE: 17/9/18

CLIENT: Property Development Solutions Group

COORDS: 332792.0 m E 6255642.0 m N MGA94 56

PROJECT: St Leonards Development

SURFACE RL: 67.40 m DATUM: mAHD

LOCATION: 18 Holdsworth Avenue

INCLINATION: -90°

JOB NO: 18105360

HOLE DEPTH: 12.26 m

Drilling						Field Material Description						Defect Information			
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)		DEFECT DESCRIPTION & Additional Observations		AVERAGE DEFECT SPACING (mm)	
				0											
				1											
				1.35			Continuation of Sheet 1								
				66.05			SANDSTONE fine to medium grained, red, indistinct bedding, with bands of grey clay and ironstone gravels up to 170mm thick	XW							
				2								1.95 m: DB 2.00 m: HB			
				2.23											
				65.17			SANDSTONE fine to medium grained, red, orange and grey, indistinct bedding, with some bands of hard ironstone, iron-stained	XW - HW				2.74 m: DB			
				3								3.00 m: HB			
				3.23								3.17 m: DB			
				64.17			SANDSTONE fine to medium grained, red and grey, irregular to indistinct bedding dipping at approximately 0 to 15 degrees, iron-stained	HW				3.31 m: B, 0°, Pl, Ro, fe clay Ve			
				64.08											
				3.64											
				63.76											
				4								4.00 m: HB			
				4.64											
				62.76			red, indistinct bedding,					4.32 m: B, 0°, Pl, Ro, fe clay Ve 4.39 m: B, 5°, Pl, Ro, clay Ct, 2 mm 4.49-4.55 m: J, 90°, Pl, Ro, iron Sn, discontinuous, intact 4.56 m: B, 0°, Pl, Ro, iron Sn, intact 4.57 m: J, 80-90°, Ir, Ro, iron Sn, intact 4.64 m: J, 40-50°, Ir, Ro, iron Sn 4.67 m: DB 4.72 m: B, 0-5°, Ir, Ro, iron Sn 4.85 m: B, 0-5°, Ir, Ro, iron Sn 4.95 m: B, 0-5°, Ir, Ro, iron Sn 5.00 m: HB 5.08 m: DB			
				5											
				5.62											
				5.78			SILTSTONE fine to medium grained, dark grey, irregular bedding dipping at approximately 0 to 10 degrees								
				61.62											
				6								6.00 m: HB			
				6.07			CORE LOSS (290MM)								
				61.33											
				6.41			SANDSTONE fine to medium grained, grey, indistinct to irregular bedding dipping at approximately 0 to 10 degrees	SW				6.27 m: DB 6.33 m: B, 0-10°, Cv, Ro, Cn 6.41 m: EWS, 5°, Pl, Ro, Siltstone - low strength 6.64 m: B, 5°, Pl, Ro, Cn			
				60.94											
				7			SILTSTONE grey and dark grey, indistinct bedding dipping at approximately 0 to 5 degrees					6.96 m: B, 0-5°, Cv, Ro, Cn 7.00 m: HB 7.09 m: DB			
				7.40			SANDSTONE fine to medium grained, grey, irregular bedding dipping at approximately 0 to 10 degrees					7.30 m: J, 15-35°, Un, Ro, iron Ve, healed 7.33 m: J, 10-25°, Un, Ro, iron Ve, healed			
				7.52											
				59.88			INTERLAMINATED SILTSTONE (50%) AND SANDSTONE (50%) grey and dark grey, regular bedding dipping at approximately 5 degrees					7.57 m: B, 5°, Pl, Ro, iron Sn 7.66 m: B, 10°, Pl, Ro, Cn			
				8											
				8.16			SANDSTONE fine to medium grained, grey, irregular bedding dipping at approximately 0 to 10 degrees, with <5% carbonaceous laminations, some iron-staining					7.95 m: B, 5°, Pl, Ro, Cn, possible drill break 8.00 m: HB 8.08 m: B, 5°, Pl, Ro, iron Sn 8.10 m: J, 25°, Pl, Ro, fe clay Ct, 4 mm 8.15 m: DB 8.16 m: Bx3, 0-5°, Pl, Ro, Cn, possible drill break			
				59.24											
				9			SANDSTONE fine to medium grained, grey and orange, regular bedding dipping at approximately 10 degrees					9.00 m: HB			
				9.38											
				58.02			SANDSTONE fine to medium grained, grey, irregular bedding dipping at approximately 0 to 20 degrees, with <1% carbonaceous laminations and flecks up to 2mm thick	FR				9.36 m: DB			
				10											

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH3

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 18 Holdsworth Avenue
JOB NO: 18105360

COORDS: 332792.0 m E 6255642.0 m N MGA94 56
SURFACE RL: 67.40 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.26 m

DRILL RIG: Jackro

CONTRACTOR: Nealings Drillings

LOGGED: SL DATE: 31/8/18

CHECKED: BF DATE: 17/9/18

Drilling						Field Material Description						Defect Information			
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)		DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)		
NMLC	80% RETURN	100	100 (100)	10	50.03		SANDSTONE fine to medium grained, grey, irregular bedding dipping at approximately 0 to 20 degrees, with <1% carbonaceous laminations and flecks up to 2mm thick reduction in cross bedding	FR		PLI(D)=1.15 PLI(A)=1.23		9.96 m: HB			
				11								10.90 m: DB 11.00 m: HB			
				12								12.00 m: HB			
				12.26	55.14		END OF BOREHOLE @ 12.26 m TARGET DEPTH GROUNDWATER NOT OBSERVED GROUTED			PLI(D)=1.24 PLI(A)=1.74					
				13											
				14											
				15											
				16											
				17											
				18											
				19											
				20											

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH4

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332867.0 m E 6255636.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 57.30 m DATUM: mAHD

CONTRACTOR: Nealings Drilling Pty Ltd

LOCATION: 21 Canberra Avenue

INCLINATION: -90°

LOGGED: SL DATE: 21/8/18

JOB NO: 18105360

HOLE DEPTH: 12.32 m

CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DTC	H	Groundwater not encountered	0	57.21	BH4 0.09 Jar 0.09 m R = 0A PID = 0.1 ppm								

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH4

SHEET: 2 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 21 Canberra Avenue
JOB NO: 18105360

COORDS: 332867.0 m E 6255636.0 m N MGA94 56
SURFACE RL: 57.30 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.32 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 21/8/18
CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)		
				0			Continuation of Sheet 1							
			100 (100)	0.38	56.92		SANDSTONE fine to medium grained, yellow brown, indistinct bedding dipping at approximately 0 to 5 degrees, with roots and clay seams	XW						
				1							0.98 m: DB 1.00 m: HB 1.08 m: EWS, 5°, Pl, Ro, clay Ct, 4 mm 1.32 m: HB 1.40 m: HB			
				1.26										
				1.50										
				1.74										
				1.74										
			65 (60)	2			SANDSTONE fine to medium grained, orange, indistinct bedding dipping at approximately 10 to 20 degrees, iron-stained 1.74m: 40mm bed of yellow, fine to medium grained sandstone	MW			1.77 m: HB 1.85 m: DB 2.00 m: HB			
				3										
				3.00										
				3.52										
				3.52										
				4										
				4										
				5										
				5										
				6										
				6										
				7										
				7										
				8										
				8										
				9										
				9										
				10										
				10										

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH4

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 21 Canberra Avenue
JOB NO: 18105360

COORDS: 332867.0 m E 6255636.0 m N MGA94 56
SURFACE RL: 57.30 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.32 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 21/8/18
CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description							Defect Information											
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa				LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations		AVERAGE DEFECT SPACING (mm)							
									VL 0.8	L 2.0	M 6.0	H 20	VH 60	EH 200			10	30	100	300	1000	3000	
NMLC	0% RETURN	100	100 (100)	10	12.32 44.98		up to 2mm SANDSTONE fine to medium grained, grey, irregular bedding dipping at approximately 0 to 10 degrees, with <5% carbonaceous laminations up to 3mm thick	FR					PLI(D)=2.26 PLI(A)=1.69	10.00 m: HB									
										PLI(D)=2.04 PLI(A)=2.11	11.00 m: HB 11.09 m: DB												
			100	100 (100)					12					PLI(D)=1.32 PLI(A)=0.80	11.87 m: EWS, 5°, Pl, Ro, clay Ct, 3 mm 12.00 m: HB 12.09 m: DB								
							END OF BOREHOLE @ 12.32 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 5.36 m DEPTH STANDPIPE INSTALLED																
					13																		
					14																		
					15																		
					16																		
					17																		
					18																		
					19																		

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER PRELIMINARY REPORT OF STANDPIPE INSTALLATION: BH4

SHEET: 1 OF 1

CLIENT: Property Development Solutions Group

COORDS: 332867.0 m E 6255636.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 57.30 m DATUM: mAHD

CONTRACTOR: Nealings Drilling Pty Ltd

LOCATION: 21 Canberra Avenue

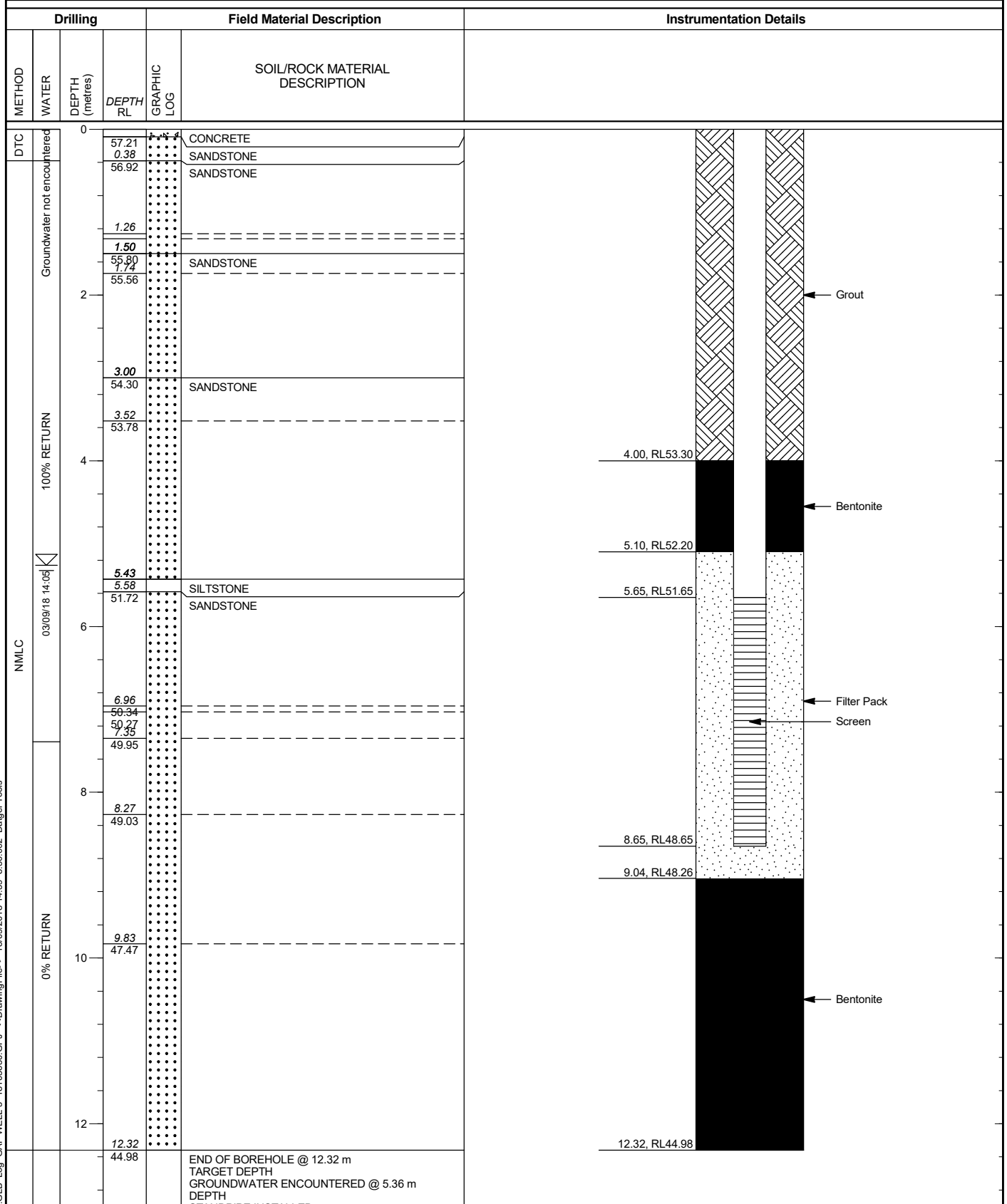
INCLINATION: -90°

LOGGED: SL DATE: 21/8/18

JOB NO: 18105360

HOLE DEPTH: 12.32 m

CHECKED: BF DATE: 17/9/18



This report of standpipe installation must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F17
RL1



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH5

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 27 Canberra Avenue
JOB NO: 18105360

COORDS: 332865.0 m E 6255587.0 m N MGA94 56
SURFACE RL: 55.90 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 13.63 m

DRILL RIG: Jackro

CONTRACTOR: Nealings Drilling

LOGGED: SL DATE: 4/9/18

CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description												
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm					
													0	5	10	15	20	25
HA	H M	Groundwater not encountered	0	0.10	DS 0.00 m				Silty SAND			FILL						
			56.30	R = 0A				fine to medium grained, sub-angular, dark brown, with roots, trace medium to coarse gravel, trace crushed sandstone										
55.40	Jar 0.00 m																	
0.50	QCA104																	
0.65	Jar 0.00 m																	
0.80	QCB104											possibly sandstone boulders or bricks placed on top of fill						
ADT	H M H			55.10	Jar 0.00 m				Silty SAND									
					PID = 0.2 ppm				fine to medium grained, sub-angular, dark brown, with roots, trace low to medium plasticity clay									
			1						increasing clay content									
									with red, fine to medium grained sand									
									SANDSTONE									
									fine to medium grained, orange and red									
			2						Silty SAND									
									fine to medium grained, sub-angular, dark brown, possibly topsoil of a previous garden bed									
									SANDSTONE									
									fine to medium grained, red, indistinct bedding, recovered as gravels and cobbles									
									For Continuation Refer to Sheet 2									
			3															
			4															
			5															
			6															
			7															
			8															
			9															
			10															

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01h
RL3



SHEET: 2 OF 3

DRILL RIG: Jackro
CONTRACTOR: Nealings Drilling
LOGGED: SL DATE: 4/9/18
CHECKED: BF DATE: 17/9/18

[illegible]GAP gINT FN. F02a
RI 3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH5

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332865.0 m E 6255587.0 m N MGA94 56

DRILL RIG: Jackro

PROJECT: St Leonards Development

SURFACE RL: 55.90 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 27 Canberra Avenue

INCLINATION: -90°

LOGGED: SL DATE: 4/9/18

JOB NO: 18105360

HOLE DEPTH: 13.63 m

CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations			AVERAGE DEFECT SPACING (mm)
NMLC	100% RETURN	100 (100)	100 (100)	10			SILTSTONE dark grey, regular to indistinct bedding dipping at approximately 0 to 5 degrees	FR		PLI(D)=0.54 PLI(A)=0.54				
				10.67	45.23		increasing sandstone laminations							
				11	11.07		SANDSTONE fine to medium grained, grey, indistinct bedding dipping at approximately 0 to 5 degrees, with <1% carbonaceous flecks up to 2mm			PLI(D)=0.59 PLI(A)=0.55	10.78 m: DB 10.88 m: HB 10.93 m: B, 0-5°, St, Sm-Ro, Cn 10.95-11.04 m: EWS, 0°, Pl, Sm, clay Ve 11.07 m: B, 5°, Pl, Sm-Ro, Cn			
				11	44.83						11.54 m: HB			
				12						PLI(D)=1.68 PLI(A)=1.19	12.00 m: HB 12.14 m: DB			
				12.75	43.15									
				13			irregular bedding dipping at approximately 0 to 15 degrees, with <5% carbonaceous flecks up to 2mm			PLI(D)=0.79 PLI(A)=0.96	13.00 m: HB			
				13.22	42.68		indistinct bedding, with <5% carbonaceous flecks up to 3mm				13.17 m: B, 5°, Pl, Ro, Cn			
				13.63										
							END OF BOREHOLE @ 13.63 m TARGET DEPTH GROUNDWATER NOT OBSERVED GROUTED							
				14										
				15										
				16										
				17										
				18										
				19										
				20										

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH6

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 31 Canberra Avenue
JOB NO: 18105360

COORDS: 332844.0 m E 6255543.0 m N MGA94 56
SURFACE RL: 49.50 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.22 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling Pty Ltd
LOGGED: SL DATE: 22/8/18
CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA		Groundwater not encountered	0	0.18	SPT 0.85-1.30 m 2, 3, 13 N=16			CL-CH	BRICK DRIVEWAY	D		FILL 0.02m layer of fine to medium grained sand between two brick layers
			49.23	SAND								
			0.50	fine to medium grained, sub-angular, brown, with silt								
			49.00	Sandy CLAY								
ADT	H	Groundwater not encountered	0.85					low to medium plasticity, yellow brown, fine to medium grained, sub-angular sand	M	VSt-H	RESIDUAL SOIL	
			48.65		CLAY							
			1.05		medium to high plasticity, yellow brown and red, trace fine to medium grained, sub-angular sand, with ironstone gravel							
			48.45		SANDSTONE							
								fine to medium grained, orange red, soil like properties, iron-stained, extremely weathered			WEATHERED ROCK	
								grey				
								For Continuation Refer to Sheet 2				
									</			

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01a
RL3



SHEET: 2 OF 3

DRILL RIG: Komatsu 05

CONTRACTOR: Nealings Drilling Pty Ltd

LOGGED: SL DATE: 22/8/18

CHECKED: BF DATE: 17/9/18

CLIENT: Property Development Solutions Group

COORDS: 332844.0 m E 6255543.0 m N MGA94 56

PROJECT: St Leonards Development

SURFACE RL: 49.50 m DATUM: mAHD

LOCATION: 31 Canberra Avenue

INCLINATION: -90°

JOB NO: 18105360

HOLE DEPTH: 12.22 m

NMLC	100% RETURN
------	-------------

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH6

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332844.0 m E 6255543.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 49.50 m DATUM: mAHD

CONTRACTOR: Nealings Drilling Pty Ltd

LOCATION: 31 Canberra Avenue

INCLINATION: -90°

LOGGED: SL DATE: 22/8/18

JOB NO: 18105360

HOLE DEPTH: 12.22 m

CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations			AVERAGE DEFECT SPACING (mm)
NMLC	100% RETURN		100 (100)	10			SANDSTONE fine to medium grained, grey, indistinct bedding dipping at 0 to 25 degrees	FR		PLI(D)=1.42 PLI(A)=1.63				
				11						PLI(D)=1.42 PLI(A)=1.30				
			100 (100)	12						PLI(D)=1.16 PLI(A)=0.86				
				12.22 37.28			END OF BOREHOLE @ 12.22 m TARGET DEPTH GROUNDWATER NOT OBSERVED GROUTED							
				13										
				14										
				15										
				16										
				17										
				18										
				19										
				20										

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH7

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 35 Canberra Avenue
JOB NO: 18105360

COORDS: 332806.0 m E 6255490.0 m N MGA94 56
SURFACE RL: 47.60 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.21 m

DRILL RIG: Komatsu 05
CONTRACTOR: Nealings Drilling
LOGGED: SL DATE: 23/8/18
CHECKED: BF DATE: 17/9/18

Drilling					Sampling		Field Material Description								
METHOD		PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION			MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
HA	H	Groundwater not encountered	0	0.13	DS 0.15 m BH7 0.15m Jar 0.15 m R = 0A QCA101 Jar 0.15 m QCB101 Jar 0.15 m PID = 0.1 ppm DS 0.50 m Jar 0.50 m R = 1B PID = 0.2 ppm Jar 0.60 m DS 0.90 m Jar 0.90 m PID = 0.1 ppm SPT 0.95-1.35 m 15, 13, 8/100mm HB N=R					CONCRETE	M	VSt-H	FILL		
	M		47.45	0.35		Crushed gravel and sandstone									
H	47.25		0.55	Silty SAND fine to medium grained, sub-angular, brown											
	47.05		0.85	trace low plasticity clay, slight sewer odour, some green and red staining											
	46.75			Clayey SAND / Sandy Clay fine to medium grained, grey, low plasticity clay											
ADT	H		1	1.20				SC / CL		increasing in clay content			RESIDUAL SOIL		
										SANDSTONE fine to medium grained, grey For Continuation Refer to Sheet 2			WEATHERED ROCK		

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH7

SHEET: 2 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332806.0 m E 6255490.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 47.60 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 35 Canberra Avenue

INCLINATION: -90°

LOGGED: SL DATE: 23/8/18

JOB NO: 18105360

HOLE DEPTH: 12.21 m

CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)		
				0										
				1										
				1.33			Continuation of Sheet 1							
				46.27			SANDSTONE	XW						
				1.65			fine to medium grained, grey, with some quartz gravel							
				45.95			SANDSTONE							
				2			fine to medium grained, grey, with roots							
				2.22										
				45.38			SANDSTONE	MW						
				3			fine to medium grained, red, indistinct bedding, iron rich							
				3.57										
				44.03			SANDSTONE	SW						
				3.87			fine to medium grained, grey, irregular cross bedding dipping at approximately 5 to 25 degrees, with less than 1% carbonaceous laminations							
				43.73			reduction in cross bedding	FR						
				4										
				4.94										
				42.66			regular distinct cross bedding dipping at approximately 15 degrees							
				5										
				6.53										
				41.07			irregular distinct cross bedding dipping at approximately 10 to 20 degrees							
				6										
				7.07										
				40.46			reduction in cross bedding	FR						
				7			CORE LOSS (30MM)							
				8.15			SANDSTONE							
				39.45			fine to medium grained, grey, irregular cross bedding dipping at approximately 5 to 25 degrees, with less than 1% carbonaceous laminations							
				8										
				8.73			irregular bedding dipping at approximately 5 to 20 degrees, with less than 1% siltstone flecks up to 7mm							
				38.87										
				9			At 8.73m: siltstone clast up to 50mm thick							
				10										

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH7

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332806.0 m E 6255490.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 47.60 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 35 Canberra Avenue

INCLINATION: -90°

LOGGED: SL DATE: 23/8/18

JOB NO: 18105360

HOLE DEPTH: 12.21 m

CHECKED: BF DATE: 17/9/18

Drilling						Field Material Description						Defect Information					
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa			LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations		AVERAGE DEFECT SPACING (mm)		
NMLC	100% RETURN	100	100	10	12.21 35.39		SANDSTONE fine to medium grained, grey, irregular cross bedding dipping at approximately 5 to 25 degrees, with less than 1% carbonaceous laminations	FR			PLI(D)=1.82 PLI(A)=1.55	10.00 m: HB 10.05 m: B, 10°, Pl, Ro, clay Ve 10.06-10.08 m: EWS, Pl, Ro, 20 mm					
			PLI(D)=1.56 PLI(A)=1.67	10.60 m: HB 10.67 m: DB 11.00 m: HB													
			PLI(D)=1.61 PLI(A)=1.83	12.00 m: HB													
				11			END OF BOREHOLE @ 12.21 m TARGET DEPTH GROUNDWATER ENCOUNTERED @ 1.73 m DEPTH STANDPIPE INSTALLED										
				12													
				13													
				14													
				15													
				16													
				17													
				18													
				19													
				20													

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER PRELIMINARY REPORT OF STANDPIPE INSTALLATION: BH7

SHEET: 1 OF 1

CLIENT: Property Development Solutions Group

COORDS: 332806.0 m E 6255490.0 m N MGA94 56

DRILL RIG: Komatsu 05

PROJECT: St Leonards Development

SURFACE RL: 47.60 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 35 Canberra Avenue

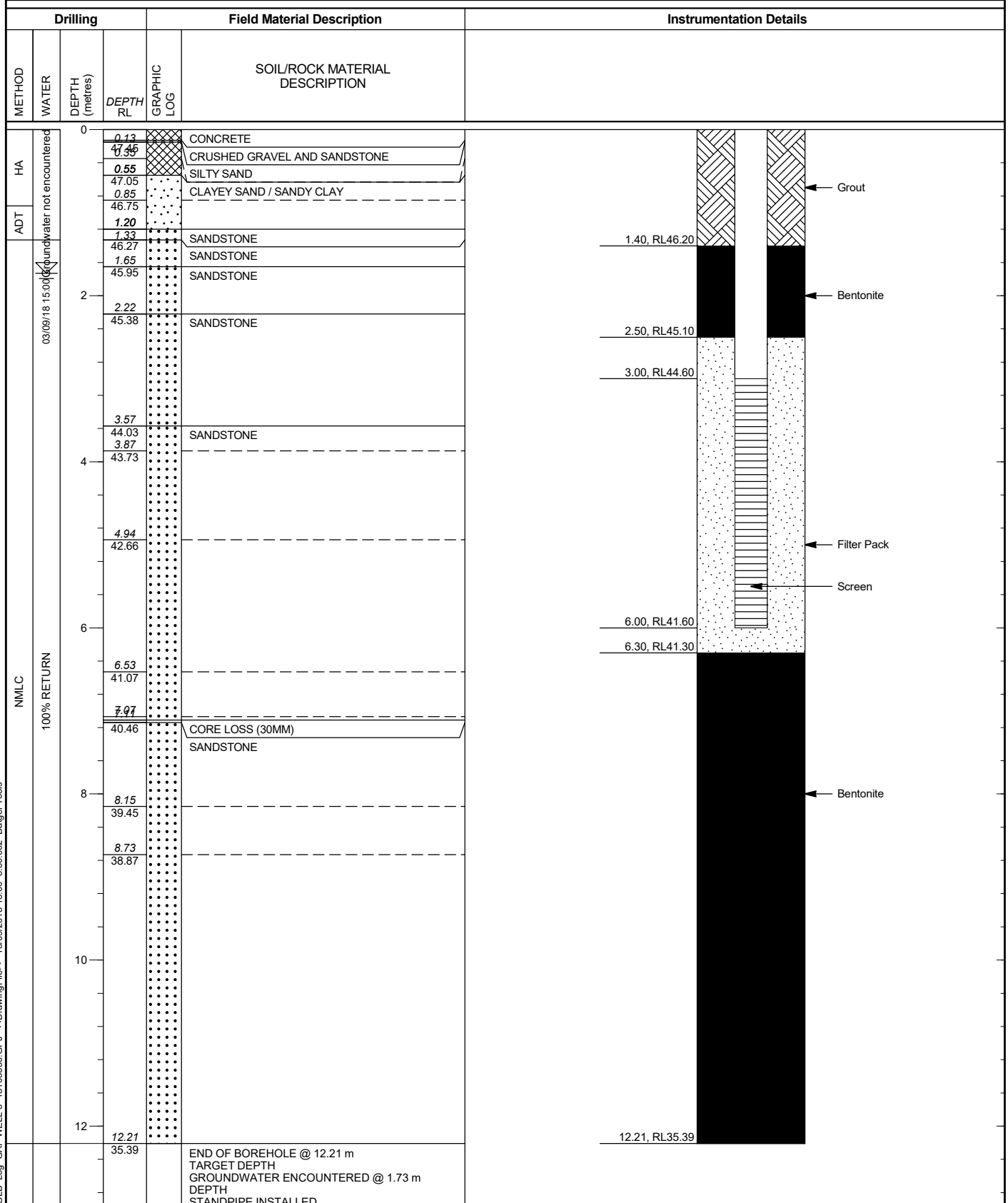
INCLINATION: -90°

LOGGED: SL DATE: 23/8/18

JOB NO: 18105360

HOLE DEPTH: 12.21 m

CHECKED: BF DATE: 17/9/18



This report of standpipe installation must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F17
RL1



SHEET: 1 OF 3

DRILL RIG: Jackro

CONTRACTOR: Nealings Drilling

LOGGED: SL DATE: 30/8/18

CHECKED: BF DATE: 17/9/18

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01h
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH8

SHEET: 2 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332820.0 m E 6255645.0 m N MGA94 56

DRILL RIG: Jackro

PROJECT: St Leonards Development

SURFACE RL: 64.50 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 18 Holdsworth Avenue

INCLINATION: -90°

LOGGED: SL DATE: 30/8/18

JOB NO: 18105360

HOLE DEPTH: 12.06 m

CHECKED: BF DATE: 17/9/18

Drilling					Field Material Description							Defect Information		
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)		DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)	
				0										
				1										
				1.45			Continuation of Sheet 1							
				63.05			SANDSTONE	XW						
				1.96			fine to medium grained, orange and red, indistinct bedding, with bands of grey, low to medium plasticity clay up to 80mm, iron-stained	HW						
				2			CORE LOSS (40MM)	XW						
				62.50			SANDSTONE	HW						
				2			fine to medium grained, orange and red, indistinct bedding dipping at approximately 0 to 15 degrees, with bands of grey, low to medium plasticity clay up to 140mm, iron-stained							
				3										
				3										
				3.71										
				60.79			SANDSTONE	MW						
				4			medium to coarse grained, orange and grey, irregular bedding dipping at approximately 0 to 25 degrees							
				4.05			4.05-4.10m: heavily iron-stained							
				60.45										
				4.51										
				59.99			regular distinct bedding dipping at approximately 0 to 25 degrees							
				5										
				5										
				5.65										
				58.85			SANDSTONE	SW						
				58.84			fine to medium grained, grey, irregular to indistinct bedding dipping at approximately 0 to 25 degrees, slightly iron-stained							
				6			5.66-5.68m: siltstone laminations up to 20mm and siltstone flecks up to 10mm long							
				6										
				7										
				7										
				7.65										
				56.85			discontinuous carbonaceous laminations							
				7.97										
				56.53			SANDSTONE	FR						
				8			fine to medium grained, grey, indistinct to irregular bedding dipping at approximately 0 to 20 degrees							
				8										
				9										
				9										
				9.59										
				54.91			irregular bedding dipping at 0 to 20 degrees							
				10										

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



SHEET: 3 OF 3

COORDS: 332820.0 m E 6255645.0 m N MGA94 56

DRILL RIG: Jackro

SURFACE RL: 64.50 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

INCLINATION: -90°

LOGGED: SL DATE: 30/8/18

HOLE DEPTH: 12.06 m

CHECKED: BF DATE: 17/9/18

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for technical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH9

SHEET: 1 OF 3

CLIENT: Property Development Solutions Group
PROJECT: St Leonards Development
LOCATION: 26 Holdsworth Avenue
JOB NO: 18105360

COORDS: 332812.0 m E 6255580.0 m N MGA94 56
SURFACE RL: 60.60 m DATUM: mAHD
INCLINATION: -90°
HOLE DEPTH: 12.34 m

DRILL RIG: Jackro

CONTRACTOR: Nealings Drilling

LOGGED: SL DATE: 28/8/18

CHECKED: BF DATE: 17/9/18

Drilling				Sampling		Field Material Description												
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS	DCP TEST (AS1289.6.3.2) Blows per 100 mm					
													0	5	10	15	20	25
ADIT	HA	Groundwater not encountered	0	60.60	DS 0.10 m R = 0A Jar 0.10 m PID = 0.3 ppm DS 0.50 m R = 0A Jar 0.50 m PID = 2.7 ppm DS 0.65 m R = 0A Jar 0.65 m PID = 1.5 ppm				Silty SAND fine to medium grained, sub-angular, dark brown, with roots CLAY medium to high plasticity, orange brown and grey, with fine to medium grained, sub-angular sand CLAY medium plasticity, grey with ironstone gravel For Continuation Refer to Sheet 2			FILL						
	L			0.30														
	M			60.30														
	H			60.55														
			1					CI		M	H	RESIDUAL SOIL						
			2															
			3															
			4															
			5															
			6															
			7															
			8															
			9															
			10															

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F01h
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH9

SHEET: 2 OF 3

DRILL RIG: Jackro

CONTRACTOR: Nealings Drilling

LOGGED: SL DATE: 28/8/18

CHECKED: BF DATE: 17/9/18

CLIENT: Property Development Solutions Group

COORDS: 332812.0 m E 6255580.0 m N MGA94 56

PROJECT: St Leonards Development

SURFACE RL: 60.60 m DATUM: mAHD

LOCATION: 26 Holdsworth Avenue

INCLINATION: -90°

JOB NO: 18105360

HOLE DEPTH: 12.34 m

Drilling					Field Material Description							Defect Information				
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa	LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)				
				0												
					0.80		Continuation of Sheet 1									
		100	0	1	59.80		SANDSTONE	HW			0.86-0.93 m: EWS, 0°, Pl, Ro, clay Ct, 70 mm					
		100	100				fine to medium grained, grey and red, bands of clay up to 70mm, iron-rich, iron-stained	XW			0.86 m: DB					
			30					HW			0.99 m: EWS, 0°, Pl, Ro, clay Ct, 10 mm					
			(70)		1.30						1.00 m: HB					
		100	100		59.30		SANDSTONE	MW		PLI(D)=1.09 PLI(A)=1.57	1.06 m: B, 15°, Pl, Ro, carbonaceou Ve					
			(100)				medium grained, grey and orange, irregular bedding dipping at approximately 0 to 15 degrees, with <1% discontinuous carbonaceous laminations, iron-stained				1.15 m: DB					
											1.39 m: J, 25°, Pl, Ro, Cn					
				2	2.00						1.77 m: HB					
					58.60		indistinct bedding dipping at approximately 0 to 15 degrees			PLI(D)=1.16 PLI(A)=1.53	1.92 m: DB					
											1.96-2.00 m: EWS, 0°, Pl, Ro, clay Ct, 40 mm					
		100	90								2.00 m: HB					
			(100)								2.51 m: B, 10°, Pl, Ro, Cn					
					2.91						2.67-2.77 m: EWS, 10°, Pl, Ro, clay Ct, 100 mm					
				3	57.69		purple and grey, <1% discontinuous carbonaceous laminations and flecks				3.00 m: HB					
										PLI(D)=0.83 PLI(A)=1.32	3.36 m: J, 25°, Pl, Ro, iron Sn					
					3.75						3.43 m: DB					
					56.85		orange and grey				3.48 m: B, 5°, Pl, Ro, iron Sn					
				4							3.60 m: B, 5°, Pl, Ro, clay Ct, 22 mm					
		100	100		4.28		4.28-4.33m: possibly disturbed bedding, oval shaped iron-staining			PLI(D)=1.08 PLI(A)=1.57	4.00 m: HB					
			(100)		56.32						4.15 m: B, 0°, Pl, Ro, iron Sn					
											4.34 m: Bx2, 0°, Pl, Ro, Cn, intact					
				5	5.10		orange and grey, iron-stained, with <1% carbonacoue laminations and flecks up to 3mm thick				4.83 m: HB					
					55.50					PLI(D)=0.96 PLI(A)=1.22	4.86 m: HB					
											4.89 m: DB					
											4.90 m: HB					
											5.00 m: HB					
											5.19 m: HB					
				6	6.24						5.68 m: B, 5°, Pl, Ro, iron Sn					
					54.36		SANDSTONE	SW		PLI(D)=0.91 PLI(A)=1.02	5.78-5.83 m: EWS, 5-20°, Ir, Ro, fe clay Ct, 50 mm					
					54.34		fine to medium grained, grey, irregular to indistinct bedding dipping at approximately 5 to 15 degrees, some siltstone flecks up to 15mm long				6.00 m: HB					
							6.26-6.36m: medium to coarse grained sandstone, with quartz gravel				6.02 m: B, 0-5°, Cv, Ro, fe Ve					
		100	85								6.24 m: B, 5°, Pl, Ro, fe clay Ve					
			(75)								6.40 m: DB					
				7							6.47 m: Bx2, 5-15°, Pl, Ro, iron Sn					
											6.53 m: B, 0-5°, Un, Ro, clay Ct, 3 mm					
											6.69-6.72 m: EWS, 0-20°, Ir, Ro, clay Ct, 30 mm					
											6.78 m: J, 25°, Ir, Ro, Cn					
										PLI(D)=0.63 PLI(A)=1.01	7.00 m: HB					
					7.40		7.4-7.7m: with 30% carbonaceous laminations				7.03 m: DB					
		100	100		53.20		reduction in carbonaceous laminations, indistinct bedding dipping at 0 to 15 degrees	FR			7.15-7.24 m: EWS, 0-30°, Ir, Ro, clay Ct, 90 mm					
			(100)		52.97						7.26 m: DB					
											7.35 m: B, 0-5°, Ir, Ro, Cn, possible drilling break					
				8							7.48 m: DB					
											7.70-7.78 m: J, 45-75°, Ir, Ro, clay Ve, intact					
										PLI(D)=1.15 PLI(A)=1.38	7.71 m: B, 0-10°, Cv, Ro, clay Ve					
											7.73 m: B, 5-10°, Ir, Ro, clay Ct, 10 mm					
											7.84 m: DB					
											7.95 m: HB					
											8.00 m: HB					
											8.04 m: HB					
					8.60		indistinct bedding				8.64 m: B, 5-15°, Ir, Ro, clay Ct, 3 mm					
					52.00						8.79 m: J, 0-25°, Ir, Ro, clay Ct, 8 mm					
				9							8.90 m: B, 10-15°, Ir, Ro, Cn					
										PLI(D)=0.92 PLI(A)=0.82	8.94 m: B, 10°, Pl, Ro, clay Ve					
											9.00 m: HB					
											9.29 m: DB					
											9.30 m: HB					
		100	100		9.73						9.69-9.73 m: EWS, 5°, Pl, Ro, clay Ct, 40 mm					
			(100)		50.87						9.87 m: HB					

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN. F02a
RL3



GOLDER

PRELIMINARY REPORT OF BOREHOLE: BH9

SHEET: 3 OF 3

CLIENT: Property Development Solutions Group

COORDS: 332812.0 m E 6255580.0 m N MGA94 56

DRILL RIG: Jackro

PROJECT: St Leonards Development

SURFACE RL: 60.60 m DATUM: mAHD

CONTRACTOR: Nealings Drilling

LOCATION: 26 Holdsworth Avenue

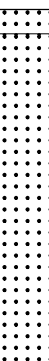
INCLINATION: -90°

LOGGED: SL DATE: 28/8/18

JOB NO: 18105360

HOLE DEPTH: 12.34 m

CHECKED: BF DATE: 17/9/18

Drilling						Field Material Description						Defect Information																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
METHOD	WATER	TCR	RQD (SCR)	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH UCS MPa				LABORATORY STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations	AVERAGE DEFECT SPACING (mm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
									VL 0.8	L 2.0	M 6.0	H 20	VH 60	EH 200			10	30	100	300	1000	3000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
NMLC	100% RETURN	100	100 (100)	10	10.16		SANDSTONE fine grained, grey, indistinct bedding dipping at approximately 0 to 5 degrees, with <1% carbonaceous laminations SANDSTONE medium grained, grey, irregular bedding dipping at 5 to 15 degrees, with <1% carbonaceous laminations indistinct bedding dipping at 0 to 5 degrees, some carbonaceous flecks up to 5mm and siltstone clasts up to 10mm wide	FR				PLI(D)=0.45 PLI(A)=1.71	9.93 m: HB 10.00 m: HB																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
				50.44																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

APPENDIX E

Field Records

Golder Associates

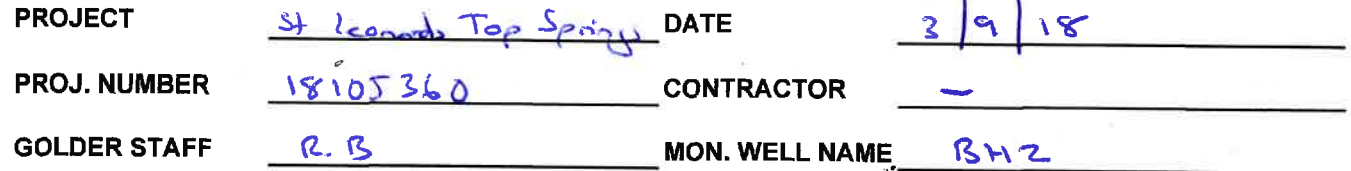
Project Number: 18105360 Date: 3/9/18 Name: Rita Bonetti
Client: St Leonards Top Springs Time arrive site: 1:00
Site Name/Location: St Leonards - Various Time leave site: 4:00
Weather Conditions: Overcast, drizzle/rain

Well development

[illegible][illegible]

The graph illustrates a positive correlation between the number of conversions and the number of lessons learned. The x-axis represents the 'NUMBER OF CONVERSIONS' and the y-axis represents the 'NUMBER OF LESSONS LEARNED'. The curve starts at the origin (0,0) and rises with a decreasing slope, indicating that while more conversions lead to more lessons learned, the rate of increase in lessons learned slows down as conversions increase.

[Signature]

Page 1 of 1

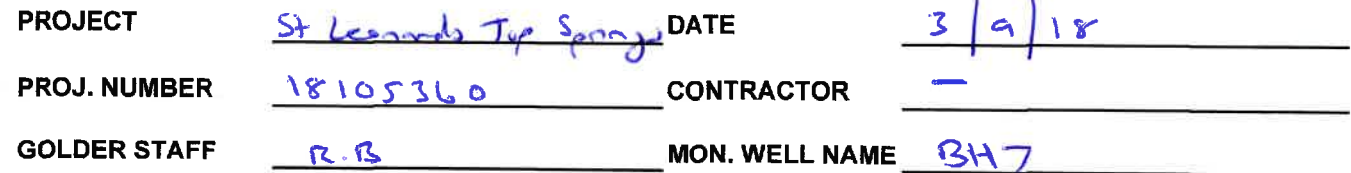
120°C, raining

DEVEL. METHOD Waterman

All depths measured below top of PVC casing (TOC)

Field Measurements

Final Measured Depth of Well from TOC (m) 7.09

Page 1 of 1

WEATHER (Temp/Cloud Cover/Precip.) 12°C, rain

CALCULATION OF MINIMUM DEVELOPMENT VOLUME

Time	Depth to Water (m)	Measured Depth of Well (m)	Depth of Well from TOC, from Mon. Well Report Sheet (m)	Metres of Standing Water D = B - A or C - A, whichever is the greater	1 Well Casing Volume (assuming 50 mm casing) (L) E = D x 2.0	Min. Total Volume to be Pumped during Development (L) F = E x 10
	A	B	C			
3:00	1.73	5.72		3.99	7.98	79.8

Field Measurements

[illegible]

Final Measured Depth of Well from TOC (m) 5.91

**Golder
Associates**

Project Number: 18105360 Date: 10/9/18 Name: R. Bonetti
Client: POS Group - Top Springs Time arrive site: 12:30
Site Name/Location: St Leonards Time leave site: 3:40
Weather Conditions: Fine, sunny

Contractor: N/A

GW Sample + survey wells

[illegible][illegible]

1 of 2

**GROUNDWATER SAMPLING RECORD FORM
FOR LOW FLOW PURGING**



PROJECT INFORMATION

Project Number: 18105360
Client: PDJ Group
Site Location: St Leonards

Date: 10/9/18
Sampled By: R.B.

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<u>25</u>
Standpipe stick up (m)	<u>Flush</u>
Time	<u>12:33</u>
Depth to water (mbRP)	<u>3.390</u>
Total depth of well (mbRP)	<u>7.095</u>
Thickness of sediment on base of well (m)	<u>-</u>

BORE ID BH02

Information from file

Surveyed reference point	<u>-</u>
Depth of well (from log)	
Standard flow rate (L/min)	
Depth of pump intake (mbRP)	<u>~ 6.0m</u>
Length of hose (m)	<u>~ 7.5m</u>
Volume in hose (m)	

Interface probe used?	<u>YES</u> / NO
Depth to product (mbRP)	<u>-</u>
Depth to water (mbRP)	<u>3.390</u>
Thickness of product (m)	<u>-</u>

Note: Standard reference point is top of PVC standpipe

mbRP - metres below top of reference point

Hose volume - 0.1 L/m of 12mm diameter hose

PURGING RECORD

Depth to water after placement of pump (mbRP) 3.25

Time	Volume Purged (L)	Conductivity (mS or μ S)	Temp ($^{\circ}$ C)	pH	Redox Potential (mV)	Dissolved Oxygen (mg/L)	Depth to Water (mbRP)	Appearance (colour, turbidity, odour, etc)
12:45	0.5	641	17.8	5.39	129.9	1.48	3.58	pale brown, low, none
12:49	1.0	612	18.1	4.73	163.1	0.50	3.79	" " "
12:55	1.5	606	18.0	4.56	160.6	0.46	3.88	" " "
1:00	2.0	604	18.0	4.52	155.3	0.49	3.97	" " "
1:05	2.5	603	18.1	4.51	152.1	0.55	4.05	" " "
1:10	3.0	599	18.1	4.43	152.1	0.69	4.13	" " "
1:15	3.5	603	18.1	4.45	152.2	0.69	4.20	" " "
Total vol. purged (L)		<u>3.5</u>	Flow Rate (L/min)					

Depth to water at end of purging (mbRP) 4.25
Purging and Sampling Equipment: Peristaltic Pump

SAMPLING RECORD

Time sampled: 1:20 Sample ID: BH02-180910
Sample Appearance: Colour pale brown Turbidity Low / Medium / High
Odour none Hydrocarbon sheen? none
Sample Container and Preservation: Duplicate sample taken? / Dup ID: no
1 x 60ml plastic nitric acid
2 x 40ml vials H₂SO₄
2 x 100ml amber glass unpreserved

OBSERVATIONS

Weather Conditions: Temperature: 19.2 $^{\circ}$ C
Precipitation: none
Notes: water level not stabilizing even in screen Pump as lowest setting.

GROUNDWATER SAMPLING RECORD FORM FOR LOW FLOW PURGING



PROJECT INFORMATION

Project Number: 18105360
Client: POJ Group
Site Location: St. Leonards

Date: 10/9/18
Sampled By: R.S.

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<u>25</u>
Standpipe stick up (m)	<u>Flush</u>
Time	<u>1:45</u>
Depth to water (mbRP)	<u>5.200</u>
Total depth of well (mbRP)	<u>8.100</u>
Thickness of sediment on base of well (m)	<u>-</u>

BORE ID BH04

Information from file

Surveyed reference point	
Depth of well (from log)	<u>-</u>
Standard flow rate (L/min)	<u>-</u>
Depth of pump intake (mbRP)	<u>~7.0</u>
Length of hose (m)	<u>~8.0</u>
Volume in hose (m)	<u>-</u>

Interface probe used?	<u>YES</u> / NO
Depth to product (mbRP)	<u>-</u>
Depth to water (mbRP)	<u>5.20</u>
Thickness of product (m)	<u>-</u>

Note: Standard reference point is top of PVC standpipe

mbRP - metres below top of reference point

Hose volume - 0.1 L/m of 12mm diameter hose

PURGING RECORD

Depth to water after placement of pump (mbRP) 5.20

Time	Volume Purged (L)	Conductivity (mS or μ S)	Temp ($^{\circ}$ C)	pH	Redox Potential (mV)	Dissolved Oxygen (mg/L)	Depth to Water (mbRP)	Appearance (colour, turbidity, odour, etc)
1:56	0.5	614	18.0	5.75	-77.9	0.63	5.21	clear, low, none
1:59	1.0	617	18.1	5.77	-78.2	0.51	5.21	" " "
2:02	1.5	622	18.1	5.81	-74.4	0.35	5.21	" " "
2:05	2.0	626	18.1	5.82	-73.3	0.30	5.21	" " "
2:08	2.5	628	18.1	5.83	-72.2	0.27	5.21	" " "
Total vol. purged (L)		<u>2.5</u>	Flow Rate (L/min)					

Depth to water at end of purging (mbRP) 5.21
Purging and Sampling Equipment: Peristaltic Pump

SAMPLING RECORD

Time sampled: 2:10
Sample Appearance: Colour clear Turbidity Low / Medium / High
Odour none Hydrocarbon sheen? none
Sample Container and Preservation: Duplicate sample taken? / Dup ID: 6CA200/6CB200
1 x 60mL plastic nitric acid
2 x 40mL glass x 3
2 x 100mL amber glass
2 x 100mL amber glass → extra volume
2 x 125mL plastic unpreserved

OBSERVATIONS

Weather Conditions: Temperature: 20.0
Precipitation: none
Notes: water around toe

GROUNDWATER SAMPLING RECORD FORM FOR LOW FLOW PURGING



PROJECT INFORMATION

Project Number: 18105360
Client: PDS Group
Site Location: St. Leonards

Date: 10/9/18
Sampled By: R.S.

GROUNDWATER WELL DATA

Information recorded on site

Diameter of standpipe (mm)	<u>25</u>
Standpipe stick up (m)	<u>Flush</u>
Time	<u>2:50</u>
Depth to water (mbRP)	<u>1.99</u>
Total depth of well (mbRP)	<u>5.91</u>
Thickness of sediment on base of well (m)	<u>-</u>

BORE ID BH07

Information from file

Surveyed reference point	
Depth of well (from log)	
Standard flow rate (L/min)	
Depth of pump intake (mbRP)	<u>~5.0m</u>
Length of hose (m)	<u>~6.5m</u>
Volume in hose (m)	

Interface probe used?	<u>YES</u> NO
Depth to product (mbRP)	<u>-</u>
Depth to water (mbRP)	<u>1.99</u>
Thickness of product (m)	<u>-</u>

Note: Standard reference point is top of PVC standpipe

mbRP - metres below top of reference point

Hose volume - 0.1 L/m of 12mm diameter hose

PURGING RECORD

Depth to water after placement of pump (mbRP) 1.90

Time	Volume Purged (L)	Conductivity (mS or μ S)	Temp ($^{\circ}$ C)	pH	Redox Potential (mV)	Dissolved Oxygen (mg/L)	Depth to Water (mbRP)	Appearance (colour, turbidity, odour, etc)
<u>2:56</u>	<u>0.5</u>	<u>883</u>	<u>16.5</u>	<u>5.86</u>	<u>35.6</u>	<u>0.82</u>	<u>2.10</u>	<u>clear, low, none</u>
<u>3:01</u>	<u>1.0</u>	<u>883</u>	<u>16.5</u>	<u>5.83</u>	<u>23.9</u>	<u>0.42</u>	<u>2.22</u>	<u>" " "</u>
<u>3:06</u>	<u>1.5</u>	<u>880</u>	<u>16.4</u>	<u>5.84</u>	<u>9.0</u>	<u>0.36</u>	<u>2.35</u>	<u>" " "</u>
<u>3:11</u>	<u>2.0</u>	<u>877</u>	<u>16.4</u>	<u>5.82</u>	<u>1.7</u>	<u>0.28</u>	<u>2.47</u>	<u>" " "</u>
<u>3:16</u>	<u>2.5</u>	<u>871</u>	<u>16.4</u>	<u>5.80</u>	<u>-7.7</u>	<u>0.24</u>	<u>2.56</u>	<u>" " "</u>
<u>3:21</u>	<u>3.0</u>	<u>868</u>	<u>16.4</u>	<u>5.79</u>	<u>-14.1</u>	<u>0.22</u>	<u>2.62</u>	<u>" " "</u>
Total vol. purged (L)		<u>3.0</u>	Flow Rate (L/min)					

Depth to water at end of purging (mbRP) 2.68
Purging and Sampling Equipment: Peristaltic Pump

SAMPLING RECORD

Time sampled: 3:25 Sample ID: BH07-180910
Sample Appearance: Colour clear Turbidity Low / Medium / High
Odour none Hydrocarbon sheen? no
Duplicate sample taken? / Dup ID: -

Sample Container and Preservation:

1 x 60mL plastic nitric acid
2 x 40mL vials H_2SO_4
2 x 100mL amber glass unpreserved
2 x 125mL plastic unpreserved

OBSERVATIONS

Weather Conditions: Temperature: 20 $^{\circ}$ C
Precipitation: none

Notes: water around TOC

water level not stabilising, pump on lowest setting

APPENDIX F

Calibration Records

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-111119



Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137		97.9ppm

Calibrated by: M.W. Michelle Wagner

Calibration date: 17/08/2018

Next calibration due: 13/02/2019



GOLDER

File Copy

**CALIBRATION CERTIFICATE FOR
PHOTO IONIZATION DETECTOR (PID)**

MAKE: ProCheck Tiger PROJECT NO: 18105360

MODEL: _____

SERIAL NO.: T-111119

Iso-Butylene: 99.29 Zero: 0.0 Clean Air

Iso-Butylene Cylinder No: 1810-2939 Certificate No: _____
Lot: 843821

The above detector was calibrated in accordance with the manufacturers specifications.

SIGNED: [Signature]

DATE: 22/8/18

This PID does not distinguish between individual chemicals. The reading displayed represents the total concentration of all ionizable chemicals in the sample. The Thermo Environmental Instruments, 580 EZ —Organic Vapour Metre is equipped with a 10.6 eV lamp. Relative response data, from which approximations can be made for concentrations of specific pure chemicals, are provided in the User's Manual.

Oil / Water Interface Meter

Instrument Solinst Interface Meter (60M)
Serial No. 122 009772-1

**airmet**

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by:

Sarah Lian

Calibration date:

30/08/2018

Next calibration due:

29/10/2018

Oil / Water Interface Meter

Instrument	Geotech Interface Meter (30M)
Serial No.	4000



airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Compartment	✓	
	Capacity	✓	
Probe	Cleaned/Decon.	✓	
	Operation	✓	
Connectors	Condition	✓	
		✓	
Tape Check	Cleaned	✓	
Connectors	Checked for cuts	✓	
Instrument Test	At surface level	✓	

Certificate of Calibration

This is to certify that the above instrument has been cleaned and tested.

Calibrated by:



Sophie Boler

Calibration date:

7/09/2018

Next calibration due:

6/03/2019

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 11C100764



airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. mV	✓	
	3. EC	✓	
	4. D.O	✓	
	5. Temp	✓	
Alarms	Beeper	✓	
	Settings	✓	
Software	Version	✓	
Data logger	Operation	✓	
Download	Operation	✓	
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 10.00		pH 10.00		320322	pH 9.55
2. pH 7.00		pH 7.00		307928	pH 6.87
3. pH 4.00		pH 4.00		316086	pH 4.12
4. mV		231.8mV		311901/311902	232.8mV
5. EC		2.76mS		306341	2.74mS
6. D.O		0.00 ppm		5928	0.03ppm
7. Temp		21.3°C		MultiTherm	20.8°C

Calibrated by:

Sarah Lian

Calibration date:

07/09/2018

Next calibration due:

06/03/2019

APPENDIX G

Laboratory Certificates

SAMPLE CHAIN OF CUSTODY DOCUMENTATION

Sheet 1 of 2

Project No: 18105360		Lab Name: ALS		GOLDER ASSOCIATES PTY LTD		Phone: (02) 9478 3900																																																																																																																															
Site Location: St Leonards Top Spring		Quote No: EN/002/17		124 Pacific Highway, Greenwich		Fax: (02) 9478 3901																																																																																																																															
Sampled By: RB / SL		Order No:		Project Manager: Rita Bonetti		Reviewed: SPD																																																																																																																															
Turnaround Time: 24hrs ☐ 48hrs ☐ Standard ☒		Date Required By:		Job Contact: Rita Bonetti		Phone: 0437039929		Email: rbonetti@golder.com.au																																																																																																																													
Delivery Option: HARD ☐ FAX ☐ DISK ☐ EMAIL ☒ BULLETIN BOARD ☐		ANALYSIS REQUIRED																																																																																																																																			
Report Format: PDF ☒ EXCEL ☒ ESDAT ☒																																																																																																																																					
Comments/Special Instructions:						<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">HOLD</td> <td style="width: 10%;">\$16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs</td> <td style="width: 10%;">\$26 - 8 metals, TRH, BTEXN & PAHs</td> <td style="width: 10%;">EA200 - Asbestos Presence/Absence</td> <td style="width: 10%;">W5 - TRH (G-C40) / BTEXN / 8 total metals</td> <td style="width: 10%;">Send to S&S</td> </tr> </table>				HOLD	\$16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs	\$26 - 8 metals, TRH, BTEXN & PAHs	EA200 - Asbestos Presence/Absence	W5 - TRH (G-C40) / BTEXN / 8 total metals	Send to S&S																																																																																																																						
										HOLD	\$16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs	\$26 - 8 metals, TRH, BTEXN & PAHs	EA200 - Asbestos Presence/Absence	W5 - TRH (G-C40) / BTEXN / 8 total metals	Send to S&S																																																																																																																						
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>LAB ID</th> <th>SAMPLE ID</th> <th>SAMPLE TIME</th> <th>SAMPLE DATE</th> <th>SAMPLE TYPE</th> <th>SAMPLE MATRIX</th> <th>No CONTAINERS</th> <th>Level of Contamination (Low/High/Unknown)</th> </tr> <tr><td>1</td><td>BH02_0.05</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>2</td><td>BH02_0.5</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>3</td><td>BH02_0.8</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>4</td><td>BH04_0.1</td><td></td><td>21/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>5</td><td>BH06_0.08</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>6</td><td>BH06_0.22</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>7</td><td>BH06_0.5</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>8</td><td>BH07_0.15</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>9</td><td>BH07_0.5</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>10</td><td>BH07_0.6</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>11</td><td>BH07_0.9</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td></tr> <tr><td>12</td><td>QCA100</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>13</td><td>QCA101</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>—</td><td>QCB100</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> <tr><td>—</td><td>QCB101</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td></tr> </table>						LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	No CONTAINERS	Level of Contamination (Low/High/Unknown)	1	BH02_0.05		20/08/2018	DS	Soil	2	U	2	BH02_0.5		20/08/2018	DS	Soil	2	U	3	BH02_0.8		20/08/2018	DS	Soil	1	U	4	BH04_0.1		21/08/2018	DS	Soil	1	U	5	BH06_0.08		22/08/2018	DS	Soil	2	U	6	BH06_0.22		22/08/2018	DS	Soil	2	U	7	BH06_0.5		22/08/2018	DS	Soil	2	U	8	BH07_0.15		23/08/2018	DS	Soil	2	U	9	BH07_0.5		23/08/2018	DS	Soil	1	U	10	BH07_0.6		23/08/2018	DS	Soil	1	U	11	BH07_0.9		23/08/2018	DS	Soil	2	U	12	QCA100		20/08/2018	DS	Soil	1	U	13	QCA101		23/08/2018	DS	Soil	1	U	—	QCB100		20/08/2018	DS	Soil	1	U	—	QCB101		23/08/2018	DS	Soil	1	U
LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	No CONTAINERS	Level of Contamination (Low/High/Unknown)																																																																																																																														
1	BH02_0.05		20/08/2018	DS	Soil	2	U																																																																																																																														
2	BH02_0.5		20/08/2018	DS	Soil	2	U																																																																																																																														
3	BH02_0.8		20/08/2018	DS	Soil	1	U																																																																																																																														
4	BH04_0.1		21/08/2018	DS	Soil	1	U																																																																																																																														
5	BH06_0.08		22/08/2018	DS	Soil	2	U																																																																																																																														
6	BH06_0.22		22/08/2018	DS	Soil	2	U																																																																																																																														
7	BH06_0.5		22/08/2018	DS	Soil	2	U																																																																																																																														
8	BH07_0.15		23/08/2018	DS	Soil	2	U																																																																																																																														
9	BH07_0.5		23/08/2018	DS	Soil	1	U																																																																																																																														
10	BH07_0.6		23/08/2018	DS	Soil	1	U																																																																																																																														
11	BH07_0.9		23/08/2018	DS	Soil	2	U																																																																																																																														
12	QCA100		20/08/2018	DS	Soil	1	U																																																																																																																														
13	QCA101		23/08/2018	DS	Soil	1	U																																																																																																																														
—	QCB100		20/08/2018	DS	Soil	1	U																																																																																																																														
—	QCB101		23/08/2018	DS	Soil	1	U																																																																																																																														
SAMPLE MATRIX = Soil/Sediment/Fill/Water/Other						SAMPLE TYPE = Composite(C)/Discrete(DC)/Disturbed(DS)/Core(CR), Grab Sample (GS)				HIGH CONCENTRATION: circle expected parameters in analy																																																																																																																											
SIGNATURE		COMPANY		DATE		TIME		SIGNATURE		COMPANY																																																																																																																											
RELEASED BY: <i>[Signature]</i>		Golder Associates		24/8/18		11:00am		RELEASED BY:																																																																																																																													
RECEIVED BY: <i>[Signature]</i>		ALS		24/8/18		1500		RECEIVED BY:																																																																																																																													
RELEASED BY:								To Be Filled Out By Analysing Laboratory		LAB DATE																																																																																																																											
RECEIVED BY:								Security Seal																																																																																																																													
RELEASED BY:								Suitable Containers																																																																																																																													
RECEIVED BY:								Cool Box																																																																																																																													

Environmental Division
Sydney
Work Order Reference
ES1825146



Telephone: +61-2-8784 8555

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1825146

Client : GOLDER ASSOCIATES Contact : MS RITA BONETTI Address : LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065 E-mail : RBonetti@golder.com.au Telephone : +61 02 9478 3900 Facsimile : +61 02 9478 3901 Project : 18105360 Order number : C-O-C number : ---- Site : ST LEONARDS TOP SPRING Sampler : RB/SL	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@alsglobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2017GOLASS0027 (EN/002/18 National BQ) QC Level : NEPM 2013 B3 & ALS QC Standard
---	--

Dates

Date Samples Received : 24-Aug-2018 15:00 Client Requested Due Date : 31-Aug-2018	Issue Date : 27-Aug-2018 Scheduled Reporting Date : 31-Aug-2018
---	---

Delivery Details

Mode of Delivery : Undefined No. of coolers/boxes : 1 Receipt Detail :	Security Seal : Intact. Temperature : 3.2°C - Ice present No. of samples received / analysed : 15 / 10
--	---

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
- **Sample QCB100 and QCB101 forwarded to SGS.**
- **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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

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.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

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 - S-16 TRH/BTEXN/PAH/OC/OP/PCB/8Metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1825146-001	20-Aug-2018 00:00	BH02_0.05	✓				
ES1825146-002	20-Aug-2018 00:00	BH02_0.5		✓	✓	✓	
ES1825146-003	20-Aug-2018 00:00	BH2_0.8		✓			✓
ES1825146-004	21-Aug-2018 00:00	BH04_0.1		✓			✓
ES1825146-005	22-Aug-2018 00:00	BH06_0.08		✓	✓	✓	
ES1825146-006	22-Aug-2018 00:00	BH06_0.22	✓				
ES1825146-007	22-Aug-2018 00:00	BH06_0.5		✓			✓
ES1825146-008	23-Aug-2018 00:00	BH07_0.15		✓	✓	✓	
ES1825146-009	23-Aug-2018 00:00	BH07_0.5	✓				
ES1825146-010	23-Aug-2018 00:00	BH07_0.6	✓				
ES1825146-011	23-Aug-2018 00:00	BH07_0.9		✓			✓
ES1825146-012	20-Aug-2018 00:00	QCA100	✓				
ES1825146-013	23-Aug-2018 00:00	QCA101		✓		✓	

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-05T TRH/BTEXN/8 Metals (Total)
ES1825146-014	21-Aug-2018 00:00	RB100	✓
ES1825146-015	23-Aug-2018 00:00	RB101	✓

Proactive Holding Time Report

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



Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email au_accountspayable@golder.com.au

RITA BONETTI

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)

Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au

CERTIFICATE OF ANALYSIS

Work Order : **ES1825146**
Client : **GOLDER ASSOCIATES**
Contact : MS RITA BONETTI
Address : LEVEL 1, 124 PACIFIC HIGHWAY
 ST LEONARDS NSW, AUSTRALIA 2065
Telephone : +61 02 9478 3900
Project : 18105360
Order number :
C-O-C number : ----
Sampler : RB/SL
Site : ST LEONARDS TOP SPRING
Quote number : EN/002/18 National BQ
No. of samples received : 15
No. of samples analysed : 10

Page : 1 of 13
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 24-Aug-2018 15:00
Date Analysis Commenced : 28-Aug-2018
Issue Date : 31-Aug-2018 16:54



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

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

This Certificate of Analysis contains the following information:

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

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP068: Positive results have been confirmed by re-extraction and re-analysis.
- 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), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.5	BH2_0.8	BH04_0.1	BH06_0.08	BH06_0.5
Client sampling date / time					20-Aug-2018 00:00	20-Aug-2018 00:00	21-Aug-2018 00:00	22-Aug-2018 00:00	22-Aug-2018 00:00
Compound	CAS Number	LOR	Unit		ES1825146-002	ES1825146-003	ES1825146-004	ES1825146-005	ES1825146-007
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.4	21.3	11.6	5.9	15.6
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	----	No	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	----	----	No	----
Asbestos Type	1332-21-4	-	--		-	----	----	-	----
Sample weight (dry)	----	0.01	g		235	----	----	514	----
APPROVED IDENTIFIER:	----	-	--		S.SPOONER	----	----	S.SPOONER	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		6	8	<5	<5	12
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		12	19	12	5	20
Copper	7440-50-8	5	mg/kg		8	<5	16	<5	<5
Lead	7439-92-1	5	mg/kg		31	25	<5	15	8
Nickel	7440-02-0	2	mg/kg		<2	<2	<2	2	<2
Zinc	7440-66-6	5	mg/kg		16	8	15	30	<5
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	<0.1	----
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	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	0.13	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	0.07	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	0.06	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	0.14	----
4,4'-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	<0.05	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH02_0.5	BH2_0.8	BH04_0.1	BH06_0.08	BH06_0.5
Client sampling date / time				20-Aug-2018 00:00	20-Aug-2018 00:00	21-Aug-2018 00:00	22-Aug-2018 00:00	22-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825146-002	ES1825146-003	ES1825146-004	ES1825146-005	ES1825146-007
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
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	----	----	0.14	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	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	----
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	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH02_0.5	BH2_0.8	BH04_0.1	BH06_0.08	BH06_0.5
Client sampling date / time				20-Aug-2018 00:00	20-Aug-2018 00:00	21-Aug-2018 00:00	22-Aug-2018 00:00	22-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825146-002	ES1825146-003	ES1825146-004	ES1825146-005	ES1825146-007
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
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
^ 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



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.5	BH2_0.8	BH04_0.1	BH06_0.08	BH06_0.5
Client sampling date / time					20-Aug-2018 00:00	20-Aug-2018 00:00	21-Aug-2018 00:00	22-Aug-2018 00:00	22-Aug-2018 00:00
Compound	CAS Number	LOR	Unit		ES1825146-002	ES1825146-003	ES1825146-004	ES1825146-005	ES1825146-007
					Result	Result	Result	Result	Result
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	----	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
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		96.4	----	----	93.4	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		113	----	----	117	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		99.9	----	----	78.3	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		73.4	75.7	72.4	75.5	76.1
2-Chlorophenol-D4	93951-73-6	0.5	%		77.3	81.0	76.7	79.9	80.4
2,4,6-Tribromophenol	118-79-6	0.5	%		45.4	53.1	37.6	42.3	53.2
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		89.5	91.7	88.6	92.7	90.7
Anthracene-d10	1719-06-8	0.5	%		82.0	84.4	81.8	86.1	84.3
4-Terphenyl-d14	1718-51-0	0.5	%		74.9	77.4	75.2	79.5	78.2
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		83.2	82.8	87.6	87.8	88.1
Toluene-D8	2037-26-5	0.2	%		90.0	80.9	76.8	88.7	92.4
4-Bromofluorobenzene	460-00-4	0.2	%		83.8	78.5	76.9	86.7	88.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.15	BH07_0.9	QCA101	----	----
Client sampling date / time					23-Aug-2018 00:00	23-Aug-2018 00:00	23-Aug-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1825146-008	ES1825146-011	ES1825146-013	-----	-----
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		7.1	12.8	6.8	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	----	----	----	----
Asbestos Type	1332-21-4	-	--		-	----	----	----	----
Sample weight (dry)	----	0.01	g		366	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		S.SPOONER	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		5	2	6	----	----
Copper	7440-50-8	5	mg/kg		5	<5	<5	----	----
Lead	7439-92-1	5	mg/kg		11	<5	17	----	----
Nickel	7440-02-0	2	mg/kg		<2	<2	<2	----	----
Zinc	7440-66-6	5	mg/kg		11	<5	13	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	<0.1	----	----
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	----	----
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	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH07_0.15	BH07_0.9	QCA101	----	----
Client sampling date / time				23-Aug-2018 00:00	23-Aug-2018 00:00	23-Aug-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1825146-008	ES1825146-011	ES1825146-013	-----	-----
				Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
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	72-54-8/72-55-9/50-2	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	----	----
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	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.15	BH07_0.9	QCA101	----	----
Client sampling date / time					23-Aug-2018 00:00	23-Aug-2018 00:00	23-Aug-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1825146-008	ES1825146-011	ES1825146-013	-----	-----
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	<0.5	<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	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		<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	----	----
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	<0.5	<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	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	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	----	----
^ 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	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH07_0.15	BH07_0.9	QCA101	----	----
Client sampling date / time					23-Aug-2018 00:00	23-Aug-2018 00:00	23-Aug-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1825146-008	ES1825146-011	ES1825146-013	-----	-----
					Result	Result	Result	----	----
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	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		87.9	----	106	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		126	----	90.3	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		101	----	64.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		77.4	77.7	78.5	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		81.7	82.3	83.0	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		46.0	56.3	46.5	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		93.4	92.4	94.4	----	----
Anthracene-d10	1719-06-8	0.5	%		101	84.9	88.2	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		94.8	79.6	81.6	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		94.1	97.1	84.7	----	----
Toluene-D8	2037-26-5	0.2	%		89.2	91.6	83.7	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		81.4	89.3	84.5	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				RB100	RB101	----	----	----
Client sampling date / time				21-Aug-2018 00:00	23-Aug-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1825146-014	ES1825146-015	-----	-----	-----
				Result	Result	----	----	----
EG020T: Total 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	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
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	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB100	RB101	----	----	----
Client sampling date / time					21-Aug-2018 00:00	23-Aug-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1825146-014	ES1825146-015	-----	-----	-----
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		107	104	----	----	----
Toluene-D8	2037-26-5	2	%		97.0	96.0	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		101	97.7	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH02_0.5 - 20-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH06_0.08 - 22-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH07_0.15 - 23-Aug-2018 00:00	Mid brown sandy soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1825146	Page	: 1 of 13
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Contact	: Customer Services ES
Address	: LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9478 3900	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 24-Aug-2018
Order number	:	Date Analysis Commenced	: 28-Aug-2018
C-O-C number	: ----	Issue Date	: 31-Aug-2018
Sampler	: RB/SL		
Site	: ST LEONARDS TOP SPRING		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 15		
No. of samples analysed	: 10		



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

This 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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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**

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 (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1905855)									
ES1825146-004	BH04_0.1	EA055: Moisture Content	----	0.1	%	11.6	10.7	7.99	0% - 50%
ES1825163-012	Anonymous	EA055: Moisture Content	----	0.1	%	23.0	26.8	15.2	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1905346)									
ES1825009-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	2	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	6	8	26.2	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	11	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
ES1825146-011	BH07_0.9	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	2	2	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	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1905347)									
ES1825009-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1825146-011	BH07_0.9	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 1900318)									
ES1825009-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 1900317)									
ES1825009-001	Anonymous	EP068: alpha-BHC	319-84-6	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: 1900317) - continued									
ES1825009-001	Anonymous	EP068: Hexachlorobenzene (HCB)	118-74-1	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: gamma-BHC	58-89-9	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: Heptachlor	76-44-8	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: Heptachlor epoxide	1024-57-3	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: alpha-Endosulfan	959-98-8	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: Dieldrin	60-57-1	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: Endrin	72-20-8	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: 4,4`-DDD	72-54-8	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
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	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: 1900317)									
ES1825009-001	Anonymous	EP068: Dichlorvos	62-73-7	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: Dimethoate	60-51-5	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: Chlorpyrifos-methyl	5598-13-0	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: Fenthion	55-38-9	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: Pirimphos-ethyl	23505-41-1	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: Bromophos-ethyl	4824-78-6	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: Prothiofos	34643-46-4	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: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	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-methyl	298-00-0	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



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: 1900316)									
ES1825200-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	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): Acenaphthene	83-32-9	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): Phenanthrene	85-01-8	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): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.6	0.7	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): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	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): Indeno(1.2.3.cd)pyrene	193-39-5	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): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	0.6	0.6	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.2	1.3	8.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1825009-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	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): Acenaphthene	83-32-9	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): Phenanthrene	85-01-8	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): Fluoranthene	206-44-0	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): Benz(a)anthracene	56-55-3	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): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	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): Indeno(1.2.3.cd)pyrene	193-39-5	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): Benzo(g,h,i)perylene	191-24-2	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
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 13
 Work Order : ES1825146
 Client : GOLDER ASSOCIATES
 Project : 18105360



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 Petroleum Hydrocarbons (QC Lot: 1900315)									
ES1825200-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	2850	2570	10.5	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	2420	2280	5.86	0% - 50%
		EP071: C10 - C14 Fraction	----	50	mg/kg	<110	<110	0.00	No Limit
ES1825009-001	Anonymous	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 Petroleum Hydrocarbons (QC Lot: 1900335)									
ES1825146-002	BH02_0.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1825200-003	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1900315)									
ES1825200-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	4340	3880	11.2	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	1650	1950	16.6	0% - 50%
		EP071: >C10 - C16 Fraction	----	50	mg/kg	420	280	39.3	No Limit
ES1825009-001	Anonymous	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1900335)									
ES1825146-002	BH02_0.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1825200-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1900335)									
ES1825146-002	BH02_0.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	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: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1825200-003	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	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: 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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1901839)									
ES1825135-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Page : 6 of 13
 Work Order : ES1825146
 Client : GOLDER ASSOCIATES
 Project : 18105360



Sub-Matrix: **WATER**

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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1901839) - continued									
ES1825135-006	Anonymous	EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ES1825259-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.004	0.003	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.004	0.002	38.8	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.045	0.042	5.70	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1901982)									
ES1825146-014	RB100	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1825293-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0016	0.0016	0.00	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1900887)									
ES1825180-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1900918)									
ES1825144-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1825180-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1900887)									
ES1825180-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1900918)									
ES1825144-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1825180-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1900918)									
ES1825144-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1825180-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Page : 7 of 13
Work Order : ES1825146
Client : GOLDER ASSOCIATES
Project : 18105360



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 (%)
EP080: BTEXN (QC Lot: 1900918) - continued									
ES1825180-004	Anonymous	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
		106-42-3							
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

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 Spike (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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Result				
<5	21.7 mg/kg	103	86	126
<1	4.64 mg/kg	101	83	113
<2	43.9 mg/kg	92.2	76	128
<5	32 mg/kg	100	86	120
<5	40 mg/kg	102	80	114
<2	55 mg/kg	103	87	123
<5	60.8 mg/kg	110	80	122
<0.1	2.57 mg/kg	75.8	70	105
<0.1	1 mg/kg	95.0	62	126
<0.05	0.5 mg/kg	97.6	69	113
<0.05	0.5 mg/kg	100	65	117
<0.05	0.5 mg/kg	100	67	119
<0.05	0.5 mg/kg	100	68	116
<0.05	0.5 mg/kg	99.6	65	117
<0.05	0.5 mg/kg	100	67	115
<0.05	0.5 mg/kg	101	69	115
<0.05	0.5 mg/kg	102	62	118
<0.05	0.5 mg/kg	102	63	117
<0.05	0.5 mg/kg	98.6	66	116
<0.05	0.5 mg/kg	100	64	116
<0.05	0.5 mg/kg	100	66	116
<0.05	0.5 mg/kg	100	67	115
<0.05	0.5 mg/kg	96.8	67	123
<0.05	0.5 mg/kg	102	69	115
<0.05	0.5 mg/kg	104	69	121
<0.05	0.5 mg/kg	92.7	56	120
<0.05	0.5 mg/kg	102	62	124
<0.2	0.5 mg/kg	100.0	66	120
<0.05	0.5 mg/kg	104	64	122
<0.2	0.5 mg/kg	94.7	54	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 1900317) - continued								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	75.5	59	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.2	62	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	72.4	54	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	67	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.5	70	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	72	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	87.3	68	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	95.0	68	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	95.3	69	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.1	76	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	90.8	64	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.7	70	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	94.1	69	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	95.4	66	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	68	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	98.1	62	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.7	68	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	65	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	68.0	41	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1900316)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	116	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	115	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	115	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	118	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	117	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	117	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	122	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	123	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	107	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	110	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	103	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	112	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	110	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	102	61	121
EP075(SIM): Dibenzo(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	102	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	101	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900315)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	95.1	75	129



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900315) - continued								
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	104	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	94.4	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900335)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	74.6	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900315)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	102	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	99.6	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	84.4	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900335)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	76.1	68	128
EP080: BTEXN (QCLot: 1900335)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	83.4	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	91.9	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	92.8	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	92.0	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	97.6	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	93.8	63	119
Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 1901839)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	100	82	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.3	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	86	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	85	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.6	79	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1901982)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.2	77	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900887)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	88.1	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.6	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	92.6	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900918)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	100	75	127



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900887)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	93.5	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	99.0	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	83.1	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900918)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	101	75	127
EP080: BTEXN (QCLot: 1900918)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	101	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	102	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	104	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	104	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	107	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	105	70	120

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**

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
EG005T: Total Metals by ICP-AES (QCLot: 1905346)							
ES1825009-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	95.3	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	98.6	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.5	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	97.4	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	97.8	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.4	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	104	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1905347)							
ES1825009-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	75.9	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 1900318)							
ES1825009-001	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	76.0	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 1900317)							
ES1825009-001	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	101	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	91.2	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	96.7	70	130

Matrix Spike (MS) Report

Matrix Spike (MS) Report

Sub-matrix: WATER				Matrix Spike (MS) Report			
		Spike	Spike Recovery (%)	Recovery Limits (%)			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1901839)							



Sub-Matrix: **WATER**

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
EG020T: Total Metals by ICP-MS (QCLot: 1901839) - continued							
ES1825146-014	RB100	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	102	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	107	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	102	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	97.0	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	101	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	100	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1901982)							
ES1825146-015	RB101	EG035T: Mercury	7439-97-6	0.01 mg/L	82.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900887)							
ES1825180-004	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	77.5	74	150
		EP071: C15 - C28 Fraction	----	300 µg/L	111	77	153
		EP071: C29 - C36 Fraction	----	200 µg/L	90.6	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1900918)							
ES1825144-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	87.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900887)							
ES1825180-004	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	81.9	74	150
		EP071: >C16 - C34 Fraction	----	350 µg/L	112	77	153
		EP071: >C34 - C40 Fraction	----	150 µg/L	85.3	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1900918)							
ES1825144-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	85.7	70	130
EP080: BTEXN (QCLot: 1900918)							
ES1825144-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	95.0	70	130
		EP080: Toluene	108-88-3	25 µg/L	91.4	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.6	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	92.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	96.8	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	95.5	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1825146	Page	: 1 of 10
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 24-Aug-2018
Site	: ST LEONARDS TOP SPRING	Issue Date	: 31-Aug-2018
Sampler	: RB/SL	No. of samples received	: 15
Order number	:	No. of samples analysed	: 10

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.
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075(SIM)S: Phenolic Compound Surrogates	ES1825146-004	BH04_0.1	2.4.6-Tribromophenol	118-79-6	37.6 %	40-138 %	Recovery less than lower data quality objective

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BH02_0.5, BH2_0.8	20-Aug-2018	----	----	----	30-Aug-2018	03-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH04_0.1	21-Aug-2018	----	----	----	30-Aug-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH06_0.08, BH06_0.5	22-Aug-2018	----	----	----	30-Aug-2018	05-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH07_0.15, BH07_0.9, QCA101	23-Aug-2018	----	----	----	30-Aug-2018	06-Sep-2018	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200) BH02_0.5	20-Aug-2018	----	----	----	28-Aug-2018	16-Feb-2019	✓
Snap Lock Bag: Separate bag received (EA200) BH06_0.08	22-Aug-2018	----	----	----	28-Aug-2018	18-Feb-2019	✓
Snap Lock Bag: Separate bag received (EA200) BH07_0.15	23-Aug-2018	----	----	----	28-Aug-2018	19-Feb-2019	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH02_0.5, BH2_0.8	20-Aug-2018	30-Aug-2018	16-Feb-2019	✓	30-Aug-2018	16-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH04_0.1	21-Aug-2018	30-Aug-2018	17-Feb-2019	✓	30-Aug-2018	17-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH06_0.08, BH06_0.5	22-Aug-2018	30-Aug-2018	18-Feb-2019	✓	30-Aug-2018	18-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH07_0.15, BH07_0.9, QCA101	23-Aug-2018	30-Aug-2018	19-Feb-2019	✓	30-Aug-2018	19-Feb-2019	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T) BH02_0.5,	BH2_0.8	20-Aug-2018	30-Aug-2018	17-Sep-2018	✔	30-Aug-2018	17-Sep-2018	✔
Soil Glass Jar - Unpreserved (EG035T) BH04_0.1		21-Aug-2018	30-Aug-2018	18-Sep-2018	✔	30-Aug-2018	18-Sep-2018	✔
Soil Glass Jar - Unpreserved (EG035T) BH06_0.08,	BH06_0.5	22-Aug-2018	30-Aug-2018	19-Sep-2018	✔	30-Aug-2018	19-Sep-2018	✔
Soil Glass Jar - Unpreserved (EG035T) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	30-Aug-2018	20-Sep-2018	✔	30-Aug-2018	20-Sep-2018	✔
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066) BH02_0.5		20-Aug-2018	28-Aug-2018	03-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP066) BH06_0.08		22-Aug-2018	28-Aug-2018	05-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP066) BH07_0.15,	QCA101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068) BH02_0.5		20-Aug-2018	28-Aug-2018	03-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP068) BH06_0.08		22-Aug-2018	28-Aug-2018	05-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP068) BH07_0.15,	QCA101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068) BH02_0.5		20-Aug-2018	28-Aug-2018	03-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP068) BH06_0.08		22-Aug-2018	28-Aug-2018	05-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP068) BH07_0.15,	QCA101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✔	30-Aug-2018	07-Oct-2018	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH02_0.5,	BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✔	29-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP075(SIM)) BH04_0.1		21-Aug-2018	28-Aug-2018	04-Sep-2018	✔	29-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP075(SIM)) BH06_0.08,	BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✔	29-Aug-2018	07-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP075(SIM)) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	28-Aug-2018	06-Sep-2018	✔	29-Aug-2018	07-Oct-2018	✔



Matrix: **SOIL**

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

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080) BH02_0.5,	BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✓	29-Aug-2018	03-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH02_0.5,	BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH04_0.1		21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	29-Aug-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH04_0.1		21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH06_0.08,	BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✓	29-Aug-2018	05-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH06_0.08,	BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	29-Aug-2018	06-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080) BH02_0.5,	BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✓	29-Aug-2018	03-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH02_0.5,	BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH04_0.1		21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	29-Aug-2018	04-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH04_0.1		21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH06_0.08,	BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✓	29-Aug-2018	05-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH06_0.08,	BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	29-Aug-2018	06-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH07_0.15, QCA101	BH07_0.9,	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	30-Aug-2018	07-Oct-2018	✓



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH02_0.5, BH2_0.8	20-Aug-2018	28-Aug-2018	03-Sep-2018	✓	29-Aug-2018	03-Sep-2018	✓	
Soil Glass Jar - Unpreserved (EP080) BH04_0.1	21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	29-Aug-2018	04-Sep-2018	✓	
Soil Glass Jar - Unpreserved (EP080) BH06_0.08, BH06_0.5	22-Aug-2018	28-Aug-2018	05-Sep-2018	✓	29-Aug-2018	05-Sep-2018	✓	
Soil Glass Jar - Unpreserved (EP080) BH07_0.15, BH07_0.9, QCA101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	29-Aug-2018	06-Sep-2018	✓	

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB100	21-Aug-2018	28-Aug-2018	17-Feb-2019	✓	28-Aug-2018	17-Feb-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB101	23-Aug-2018	28-Aug-2018	19-Feb-2019	✓	28-Aug-2018	19-Feb-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB100	21-Aug-2018	----	----	----	28-Aug-2018	18-Sep-2018	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB101	23-Aug-2018	----	----	----	28-Aug-2018	20-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RB100	21-Aug-2018	28-Aug-2018	28-Aug-2018	✓	30-Aug-2018	07-Oct-2018	✓
Amber Glass Bottle - Unpreserved (EP071) RB101	23-Aug-2018	28-Aug-2018	30-Aug-2018	✓	30-Aug-2018	07-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB100	21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	28-Aug-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	28-Aug-2018	06-Sep-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) RB100	21-Aug-2018	28-Aug-2018	28-Aug-2018	✓	30-Aug-2018	07-Oct-2018	✓
Amber Glass Bottle - Unpreserved (EP071) RB101	23-Aug-2018	28-Aug-2018	30-Aug-2018	✓	30-Aug-2018	07-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB100	21-Aug-2018	28-Aug-2018	04-Sep-2018	✓	28-Aug-2018	04-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✓	28-Aug-2018	06-Sep-2018	✓



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) RB100	21-Aug-2018	28-Aug-2018	04-Sep-2018	✔	28-Aug-2018	04-Sep-2018	✔
Amber VOC Vial - Sulfuric Acid (EP080) RB101	23-Aug-2018	28-Aug-2018	06-Sep-2018	✔	28-Aug-2018	06-Sep-2018	✔



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	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	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	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	19	10.53	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	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	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	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	5.26	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	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	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	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	5.26	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	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	7	14.29	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	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	19	5.26	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	



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)							
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	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)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	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
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 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
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)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(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 SnCl ₂ 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)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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	In house: Referenced to 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. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(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 unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ 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)



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to 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)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to 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.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Sheet..... of.....

RL3
SNT004
Feb 2011

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1825849

Client : GOLDER ASSOCIATES Contact : MS RITA BONETTI Address : LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065 E-mail : RBonetti@golder.com.au Telephone : +61 02 9478 3900 Facsimile : +61 02 9478 3901 Project : 18105360 Order number : C-O-C number : ---- Site : St Leonards Top Spring Sampler : SL	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@alsglobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2017GOLASS0027 (EN/002/18 National BQ) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 31-Aug-2018 15:00 Client Requested Due : 06-Sep-2018 Date :	Issue Date : 03-Sep-2018 Scheduled Reporting Date : 06-Sep-2018
--	--

Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 1 Receipt Detail :	Security Seal : Intact. Temperature : 2.0 - Ice present No. of samples received / analysed : 15 / 7
---	--

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
- **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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

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.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

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 - S-16	TRH/BTEXN/PAH/OC/OP/PCB/8Metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1825849-001	27-Aug-2018 00:00	BH01_0.08		✓	✓	✓	
ES1825849-002	27-Aug-2018 00:00	BH01_0.1	✓				
ES1825849-003	27-Aug-2018 00:00	BH01_0.5	✓				
ES1825849-004	30-Aug-2018 00:00	BH08_0.0		✓	✓		✓
ES1825849-005	30-Aug-2018 00:00	BH08_0.5	✓				
ES1825849-006	30-Aug-2018 00:00	BH08_1.0		✓			✓
ES1825849-007	28-Aug-2018 00:00	BH09_0.1			✓		
ES1825849-008	28-Aug-2018 00:00	BH09_0.5		✓			✓
ES1825849-009	28-Aug-2018 00:00	BH09_0.65	✓				
ES1825849-010	27-Aug-2018 00:00	QCA102	✓				
ES1825849-011	30-Aug-2018 00:00	QCA103	✓				
ES1825849-012	27-Aug-2018 00:00	QCB102	✓				
ES1825849-013	30-Aug-2018 00:00	QCB103	✓				

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-05T TRH/BTEXN/8 Metals (Total)
ES1825849-014	27-Aug-2018 00:00	RB102	✓
ES1825849-015	30-Aug-2018 00:00	RB103	✓

Proactive Holding Time Report

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

CERTIFICATE OF ANALYSIS

Work Order : **ES1825849**
Client : **GOLDER ASSOCIATES**
Contact : MS RITA BONETTI
Address : LEVEL 1, 124 PACIFIC HIGHWAY
 ST LEONARDS NSW, AUSTRALIA 2065
Telephone : +61 02 9478 3900
Project : 18105360
Order number :
C-O-C number : ----
Sampler : SL
Site : St Leonards Top Spring
Quote number : EN/002/18 National BQ
No. of samples received : 15
No. of samples analysed : 7

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 31-Aug-2018 15:00
Date Analysis Commenced : 03-Sep-2018
Issue Date : 06-Sep-2018 14:23



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

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

This Certificate of Analysis contains the following information:

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

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW



General Comments

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

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

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

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



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.08	BH08_0.0	BH08_1.0	BH09_0.1	BH09_0.5
Client sampling date / time					27-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00	28-Aug-2018 00:00	28-Aug-2018 00:00
Compound	CAS Number	LOR	Unit		ES1825849-001	ES1825849-004	ES1825849-006	ES1825849-007	ES1825849-008
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		8.4	26.9	15.1	----	16.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	----	No	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	----	No	----
Asbestos Type	1332-21-4	-	--		-	-	----	-	----
Sample weight (dry)	----	0.01	g		524	142	----	320	----
APPROVED IDENTIFIER:	----	-	--		S.SPOONER	S.SPOONER	----	S.SPOONER	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		8	<5	<5	----	18
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	<1
Chromium	7440-47-3	2	mg/kg		12	12	17	----	11
Copper	7440-50-8	5	mg/kg		10	60	7	----	11
Lead	7439-92-1	5	mg/kg		9	228	13	----	19
Nickel	7440-02-0	2	mg/kg		6	6	<2	----	<2
Zinc	7440-66-6	5	mg/kg		44	294	<5	----	33
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	<0.1	----	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				BH01_0.08	BH08_0.0	BH08_1.0	BH09_0.1	BH09_0.5
Client sampling date / time				27-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00	28-Aug-2018 00:00	28-Aug-2018 00:00
Compound	CAS Number	LOR	Unit	ES1825849-001	ES1825849-004	ES1825849-006	ES1825849-007	ES1825849-008
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.08	BH08_0.0	BH08_1.0	BH09_0.1	BH09_0.5
Client sampling date / time					27-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00	28-Aug-2018 00:00	28-Aug-2018 00:00
Compound	CAS Number	LOR	Unit		ES1825849-001	ES1825849-004	ES1825849-006	ES1825849-007	ES1825849-008
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	0.9	<0.5	----	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	0.9	<0.5	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg		<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
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	----	<0.5
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	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	1.8	<0.5	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<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
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	----	1.2
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
^ 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	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	<50



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH01_0.08	BH08_0.0	BH08_1.0	BH09_0.1	BH09_0.5
Client sampling date / time					27-Aug-2018 00:00	30-Aug-2018 00:00	30-Aug-2018 00:00	28-Aug-2018 00:00	28-Aug-2018 00:00
Compound	CAS Number	LOR	Unit		ES1825849-001	ES1825849-004	ES1825849-006	ES1825849-007	ES1825849-008
					Result	Result	Result	Result	Result
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	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		92.6	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		137	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		64.9	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		73.2	77.1	75.5	----	73.6
2-Chlorophenol-D4	93951-73-6	0.5	%		81.5	84.3	82.0	----	81.5
2,4,6-Tribromophenol	118-79-6	0.5	%		58.6	69.1	64.1	----	63.1
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		94.5	96.8	94.7	----	94.2
Anthracene-d10	1719-06-8	0.5	%		90.6	93.1	95.9	----	89.6
4-Terphenyl-d14	1718-51-0	0.5	%		77.3	79.0	81.7	----	77.3
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		88.9	86.5	90.0	----	101
Toluene-D8	2037-26-5	0.2	%		90.8	90.5	95.0	----	84.4
4-Bromofluorobenzene	460-00-4	0.2	%		85.6	86.3	90.0	----	78.2



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				RB102	RB103	----	----	----
Client sampling date / time				27-Aug-2018 00:00	30-Aug-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1825849-014	ES1825849-015	-----	-----	-----
				Result	Result	----	----	----
EG020T: Total 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	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
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	----	----	----
Toluene	108-88-3	2	µg/L	<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB102	RB103	----	----	----
Client sampling date / time					27-Aug-2018 00:00	30-Aug-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1825849-014	ES1825849-015	-----	-----	-----
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		109	108	----	----	----
Toluene-D8	2037-26-5	2	%		93.5	89.6	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		97.0	91.5	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH01_0.08 - 27-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH08_0.0 - 30-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH09_0.1 - 28-Aug-2018 00:00	Mid brown sandy soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1825849	Page	: 1 of 12
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Contact	: Customer Services ES
Address	: LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9478 3900	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 31-Aug-2018
Order number	:	Date Analysis Commenced	: 03-Sep-2018
C-O-C number	: ----	Issue Date	: 06-Sep-2018
Sampler	: SL		
Site	: St Leonards Top Spring		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 15		
No. of samples analysed	: 7		



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

This 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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW



General Comments

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

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

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

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

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**

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 (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1912626)									
ES1825848-006	Anonymous	EA055: Moisture Content	----	0.1	%	5.6	5.8	2.87	No Limit
ES1825871-001	Anonymous	EA055: Moisture Content	----	0.1	%	5.4	4.2	25.6	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1913674)									
ES1825845-034	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	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	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
ES1825848-009	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	20	25	21.1	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	11	8	29.6	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	9	45.1	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	8	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	16	10.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	32	31	4.42	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1913675)									
ES1825845-034	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1825848-009	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 1912855)									
ES1825849-001	BH01_0.08	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 1912852)									
ES1825849-001	BH01_0.08	EP068: alpha-BHC	319-84-6	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: 1912852) - continued									
ES1825849-001	BH01_0.08	EP068: Hexachlorobenzene (HCB)	118-74-1	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: gamma-BHC	58-89-9	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: Heptachlor	76-44-8	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: Heptachlor epoxide	1024-57-3	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: alpha-Endosulfan	959-98-8	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: Dieldrin	60-57-1	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: Endrin	72-20-8	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: 4,4`-DDD	72-54-8	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
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	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: 1912852)									
ES1825849-001	BH01_0.08	EP068: Dichlorvos	62-73-7	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: Dimethoate	60-51-5	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: Chlorpyrifos-methyl	5598-13-0	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: Fenthion	55-38-9	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: Pirimphos-ethyl	23505-41-1	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: Bromophos-ethyl	4824-78-6	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: Prothiofos	34643-46-4	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: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	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-methyl	298-00-0	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



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: 1912854)									
ES1825849-001	BH01_0.08	EP075(SIM): Naphthalene	91-20-3	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): Acenaphthene	83-32-9	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): Phenanthrene	85-01-8	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): Fluoranthene	206-44-0	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): Benz(a)anthracene	56-55-3	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): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	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): Indeno(1.2.3.cd)pyrene	193-39-5	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): Benzo(g,h,i)perylene	191-24-2	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
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1912332)							
ES1825849-006	BH08_1.0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1825851-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1912853)									
ES1825849-001	BH01_0.08	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: 1912332)									
ES1825849-006	BH08_1.0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1825851-001	Anonymous	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: 1912853)									
ES1825849-001	BH01_0.08	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: 1912332)									
ES1825849-006	BH08_1.0	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 12
 Work Order : ES1825849
 Client : GOLDER ASSOCIATES
 Project : 18105360



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: BTEXN (QC Lot: 1912332) - continued									
ES1825849-006	BH08_1.0	EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1825851-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1911425)									
ES1825771-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EW1803482-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0423	0.0402	5.16	0% - 20%
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.016	0.016	0.00	0% - 50%
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.180	0.186	3.23	0% - 20%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.012	0.011	8.86	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.054	0.055	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.607	0.593	2.34	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1911429)									
ES1825771-008	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1825849-014	RB102	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1912367)									
ES1825905-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1825802-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1912367)									
ES1825905-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1825802-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1912367)									
ES1825905-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit

Page : 6 of 12
 Work Order : ES1825849
 Client : GOLDER ASSOCIATES
 Project : 18105360



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 (%)
EP080: BTEXN (QC Lot: 1912367) - continued									
ES1825905-004	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1825802-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

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 Spike (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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike	Spike Recovery (%)	Recovery Limits (%)	
Result	Concentration	LCS	Low	High
<5	21.7 mg/kg	102	86	126
<1	4.64 mg/kg	100	83	113
<2	43.9 mg/kg	99.5	76	128
<5	32 mg/kg	106	86	120
<5	40 mg/kg	102	80	114
<2	55 mg/kg	106	87	123
<5	60.8 mg/kg	114	80	122
<0.1	2.57 mg/kg	79.2	70	105
<0.1	1 mg/kg	105	62	126
<0.05	0.5 mg/kg	84.7	69	113
<0.05	0.5 mg/kg	84.1	65	117
<0.05	0.5 mg/kg	86.3	67	119
<0.05	0.5 mg/kg	85.9	68	116
<0.05	0.5 mg/kg	86.8	65	117
<0.05	0.5 mg/kg	82.1	67	115
<0.05	0.5 mg/kg	85.2	69	115
<0.05	0.5 mg/kg	85.9	62	118
<0.05	0.5 mg/kg	86.2	63	117
<0.05	0.5 mg/kg	87.1	66	116
<0.05	0.5 mg/kg	86.7	64	116
<0.05	0.5 mg/kg	85.8	66	116
<0.05	0.5 mg/kg	88.5	67	115
<0.05	0.5 mg/kg	82.2	67	123
<0.05	0.5 mg/kg	86.6	69	115
<0.05	0.5 mg/kg	88.1	69	121
<0.05	0.5 mg/kg	86.6	56	120
<0.05	0.5 mg/kg	86.1	62	124
<0.2	0.5 mg/kg	84.8	66	120
<0.05	0.5 mg/kg	89.6	64	122
<0.2	0.5 mg/kg	83.0	54	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 1912852) - continued								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	59	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	80.4	62	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	80.3	54	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	88.4	67	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	79.9	70	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	82.9	72	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	77.6	68	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	75.6	68	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	69	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	76	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	81.1	64	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	83.2	70	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	82.4	69	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	83.0	66	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.5	68	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	85.6	62	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.5	68	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	65	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	74.1	41	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1912854)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	119	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	122	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	114	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	117	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	116	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	118	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	116	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	114	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	112	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	118	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	112	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	122	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	122	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	117	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	114	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	114	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1912332)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	100	68	128



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1911449) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	108	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	103	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	83.6	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1912367)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	80.4	75	127
EP080: BTEXN (QCLot: 1912367)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	85.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	86.5	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.5	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	84.6	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	85.8	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	90.2	70	120

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**

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
EG005T: Total Metals by ICP-AES (QCLot: 1913674)							
ES1825845-034	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	104	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	104	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	102	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	110	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1913675)							
ES1825845-034	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	77.3	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 1912855)							
ES1825849-001	BH01_0.08	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	93.0	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 1912852)							
ES1825849-001	BH01_0.08	EP068: gamma-BHC	58-89-9	0.5 mg/kg	108	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	99.3	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	100	70	130

Matrix Spike (MS) Report

SpikeRecovery(%)

Recovery Limits (%)

Client sample ID

Method: Compound

CAS Number

Concentration

MS

Low

High

ES1825849-001	BH01_0.08	EP068: Dieldrin	60-57-1	0.5 mg/kg	98.6	70	130
		EP068: Endrin	72-20-8	2 mg/kg	96.3	70	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	101	70	130

ES1825849-001	BH01_0.08	EP068: Diazinon	333-41-5	0.5 mg/kg	88.1	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	88.2	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	92.6	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	95.4	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	78.6	70	130

ES1825849-001	BH01_0.08	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	105	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	125	70	130

ES1825849-006	BH08 1.0	EP080: C6 - C9 Fraction	----	32.5 mg/kg	86.9	70	130
---------------	----------	-------------------------	------	------------	------	----	-----

ES1825849-001	BH01_0.08	EP071: C10 - C14 Fraction	----	523 mg/kg	91.6	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	95.8	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	105	52	132

ES1825849-006	BH08 1.0	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	102	70	130
---------------	----------	--------------------------	--------	------------	-----	----	-----

ES1825849-001	BH01_0.08	EP071: >C10 - C16 Fraction	----	860 mg/kg	88.4	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	101	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	89.6	52	132

ES1825849-006	BH08_1.0	EP080: Benzene	71-43-2	2.5 mg/kg	84.9	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	78.3	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	78.8	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	80.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	79.3	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	79.6	70	130

Matrix Spike (MS) Report

<i>SpikeRecovery</i> (%)
100
90
80
70
60
50
40
30
20
10
0

Recovery Limits (%)

Client sample ID

Method: Compound

CAS Number

Concentration

MS

Low

High

EG020T: Total Metals by ICP-MS (QCLot: 1911425)



Sub-Matrix: **WATER**

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
EG020T: Total Metals by ICP-MS (QCLot: 1911425) - continued							
ES1825771-003	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.0	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	92.3	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	91.7	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.9	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.9	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.7	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1911429)							
ES1825771-009	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	83.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1912367)							
ES1825905-004	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	85.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1912367)							
ES1825905-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	88.7	70	130
EP080: BTEXN (QCLot: 1912367)							
ES1825905-004	Anonymous	EP080: Benzene	71-43-2	25 µg/L	85.6	70	130
		EP080: Toluene	108-88-3	25 µg/L	78.8	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	84.1	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	83.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	89.5	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	96.7	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1825849	Page	: 1 of 9
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 31-Aug-2018
Site	: St Leonards Top Spring	Issue Date	: 06-Sep-2018
Sampler	: SL	No. of samples received	: 15
Order number	:	No. of samples analysed	: 7

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: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BH01_0.08	27-Aug-2018	----	----	----	04-Sep-2018	10-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH09_0.5	28-Aug-2018	----	----	----	04-Sep-2018	11-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH08_0.0, BH08_1.0	30-Aug-2018	----	----	----	04-Sep-2018	13-Sep-2018	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200) BH01_0.08	27-Aug-2018	----	----	----	04-Sep-2018	23-Feb-2019	✓
Snap Lock Bag: Separate bag received (EA200) BH09_0.1	28-Aug-2018	----	----	----	04-Sep-2018	24-Feb-2019	✓
Snap Lock Bag: Separate bag received (EA200) BH08_0.0	30-Aug-2018	----	----	----	04-Sep-2018	26-Feb-2019	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH01_0.08	27-Aug-2018	04-Sep-2018	23-Feb-2019	✓	04-Sep-2018	23-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH09_0.5	28-Aug-2018	04-Sep-2018	24-Feb-2019	✓	04-Sep-2018	24-Feb-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	26-Feb-2019	✓	04-Sep-2018	26-Feb-2019	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH01_0.08	27-Aug-2018	04-Sep-2018	24-Sep-2018	✔	05-Sep-2018	24-Sep-2018	✔
Soil Glass Jar - Unpreserved (EG035T) BH09_0.5	28-Aug-2018	04-Sep-2018	25-Sep-2018	✔	05-Sep-2018	25-Sep-2018	✔
Soil Glass Jar - Unpreserved (EG035T) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	27-Sep-2018	✔	05-Sep-2018	27-Sep-2018	✔
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP075(SIM)) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP075(SIM)) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	04-Sep-2018	10-Sep-2018	✔
Soil Glass Jar - Unpreserved (EP071) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP080) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✔	04-Sep-2018	11-Sep-2018	✔
Soil Glass Jar - Unpreserved (EP071) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔
Soil Glass Jar - Unpreserved (EP080) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✔	04-Sep-2018	13-Sep-2018	✔
Soil Glass Jar - Unpreserved (EP071) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✔	05-Sep-2018	14-Oct-2018	✔



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	04-Sep-2018	10-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	05-Sep-2018	14-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✓	04-Sep-2018	11-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✓	05-Sep-2018	14-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	04-Sep-2018	13-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP071) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	05-Sep-2018	14-Oct-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH01_0.08	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	04-Sep-2018	10-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH09_0.5	28-Aug-2018	04-Sep-2018	11-Sep-2018	✓	04-Sep-2018	11-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH08_0.0, BH08_1.0	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	04-Sep-2018	13-Sep-2018	✓

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB102	27-Aug-2018	03-Sep-2018	23-Feb-2019	✓	03-Sep-2018	23-Feb-2019	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T) RB103	30-Aug-2018	03-Sep-2018	26-Feb-2019	✓	03-Sep-2018	26-Feb-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB102	27-Aug-2018	----	----	----	03-Sep-2018	24-Sep-2018	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) RB103	30-Aug-2018	----	----	----	03-Sep-2018	27-Sep-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RB102	27-Aug-2018	03-Sep-2018	03-Sep-2018	✓	04-Sep-2018	13-Oct-2018	✓
Amber Glass Bottle - Unpreserved (EP071) RB103	30-Aug-2018	03-Sep-2018	06-Sep-2018	✓	04-Sep-2018	13-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB102	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	04-Sep-2018	10-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB103	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	04-Sep-2018	13-Sep-2018	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) RB102	27-Aug-2018	03-Sep-2018	03-Sep-2018	✓	04-Sep-2018	13-Oct-2018	✓
Amber Glass Bottle - Unpreserved (EP071) RB103	30-Aug-2018	03-Sep-2018	06-Sep-2018	✓	04-Sep-2018	13-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB102	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	04-Sep-2018	10-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB103	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	04-Sep-2018	13-Sep-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) RB102	27-Aug-2018	04-Sep-2018	10-Sep-2018	✓	04-Sep-2018	10-Sep-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB103	30-Aug-2018	04-Sep-2018	13-Sep-2018	✓	04-Sep-2018	13-Sep-2018	✓



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	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	5	20.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	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: **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	



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)							
Total Mercury by FIMS	EG035T	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	8	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	18	5.56	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
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 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
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)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (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 SnCl ₂ 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)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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	In house: Referenced to 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. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(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 unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ 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)



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to 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)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to 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.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Sheet..... of.....

RL3
SNT004
Feb 2011

THIS FORM IS TO BE SIGNED BY GOLDER STAFF; COURIER/S; LABORATORY ON RECEIPT OF SAMPLES.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1826279

Client : GOLDER ASSOCIATES Contact : MS RITA BONETTI Address : LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065 E-mail : RBonetti@golder.com.au Telephone : +61 02 9478 3900 Facsimile : +61 02 9478 3901 Project : 18105360 Order number : C-O-C number : ---- Site : St Leonards Top Spring Sampler : SL	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@alsglobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EM2017GOLASS0027 (EN/002/18 National BQ) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 05-Sep-2018 15:00	Issue Date : 06-Sep-2018
Client Requested Due Date : 12-Sep-2018	Scheduled Reporting Date : 12-Sep-2018

Delivery Details

Mode of Delivery : Pickup	Security Seal : Intact.
No. of coolers/boxes : 1	Temperature : 1.2 - Ice present
Receipt Detail :	No. of samples received / analysed : 7 / 4

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
- **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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **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 (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

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.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

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 - S-16 TRH/BTEXN/PAH/OC/OP/PCB/8Metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1826279-001	31-Aug-2018 00:00	BH03_0.0		✓	✓		✓
ES1826279-002	31-Aug-2018 00:00	BH03_0.5	✓				
ES1826279-003	31-Aug-2018 00:00	BH03_0.95		✓			✓
ES1826279-004	04-Sep-2018 00:00	BH05_0.0		✓	✓	✓	
ES1826279-005	04-Sep-2018 00:00	QCA104	✓				
ES1826279-006	04-Sep-2018 00:00	QCB104	✓				

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-05T TRH/BTEXN/8 Metals (Total)
ES1826279-007	04-Sep-2018 00:00	RB104	✓

Proactive Holding Time Report

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

ACCOUNTS PAYABLE

Email au_accountspayable@golder.com.au

[illegible]

CERTIFICATE OF ANALYSIS

Work Order : **ES1826279**
Client : **GOLDER ASSOCIATES**
Contact : MS RITA BONETTI
Address : LEVEL 1, 124 PACIFIC HIGHWAY
 ST LEONARDS NSW, AUSTRALIA 2065
Telephone : +61 02 9478 3900
Project : 18105360
Order number :
C-O-C number : ----
Sampler : SL
Site : St Leonards Top Spring
Quote number : EN/002/18 National BQ
No. of samples received : 7
No. of samples analysed : 4

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 05-Sep-2018 15:00
Date Analysis Commenced : 07-Sep-2018
Issue Date : 13-Sep-2018 11:25



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

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

This Certificate of Analysis contains the following information:

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

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW



General Comments

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

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

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

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

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

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

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

- EP071: Results of sample BH03_0.0 have been confirmed by re-extraction and re-analysis.
- EG035: Positive Hg result for ES1826279 #1 has been confirmed by reanalysis.
- EG020 : Positive results for sample ES1826279-007 has been confirmed by reanalysis.
- 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), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.0	BH03_0.95	BH05_0.0	----	----
Client sampling date / time					31-Aug-2018 00:00	31-Aug-2018 00:00	04-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1826279-001	ES1826279-003	ES1826279-004	-----	-----
					Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		13.7	12.7	17.2	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	----	No	----	----
Asbestos (Trace)	1332-21-4	5	Fibres		No	----	No	----	----
Asbestos Type	1332-21-4	-	--		-	----	-	----	----
Sample weight (dry)	----	0.01	g		442	----	404	----	----
APPROVED IDENTIFIER:	----	-	--		S.SPOONER	----	S.SPOONER	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		12	7	6	----	----
Copper	7440-50-8	5	mg/kg		46	<5	8	----	----
Lead	7439-92-1	5	mg/kg		77	24	29	----	----
Nickel	7440-02-0	2	mg/kg		6	<2	<2	----	----
Zinc	7440-66-6	5	mg/kg		140	7	40	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	----	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	----	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	----	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	----	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	----	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	----	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	----	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg		----	----	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	----	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	----	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	----	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	----	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	----	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	----	<0.05	----	----
4,4'-DDE	72-55-9	0.05	mg/kg		----	----	<0.05	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.0	BH03_0.95	BH05_0.0	----	----
Client sampling date / time					31-Aug-2018 00:00	31-Aug-2018 00:00	04-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1826279-001	ES1826279-003	ES1826279-004	-----	-----
				Result	Result	Result	Result	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin	72-20-8	0.05	mg/kg	----	----	----	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	<0.05	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	----	----	----	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg	----	----	----	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	<0.05	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	----	----	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg	----	----	----	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	----	----	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	----	----	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	----	----	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	----	----	----	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg	----	----	----	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg	----	----	----	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg	----	----	----	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	----	----	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.0	BH03_0.95	BH05_0.0	----	----
Client sampling date / time					31-Aug-2018 00:00	31-Aug-2018 00:00	04-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1826279-001	ES1826279-003	ES1826279-004	-----	-----
					Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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		0.7	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg		1.6	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg		1.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg		0.6	<0.5	<0.5	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		0.8	<0.5	<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		0.7	<0.5	<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		6.4	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		0.8	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.1	0.6	0.6	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.4	1.2	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		120	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		120	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ 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		150	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		150	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH03_0.0	BH03_0.95	BH05_0.0	----	----
Client sampling date / time					31-Aug-2018 00:00	31-Aug-2018 00:00	04-Sep-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1826279-001	ES1826279-003	ES1826279-004	-----	-----
					Result	Result	Result	----	----
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	----	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	----	110	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	----	120	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	----	70.5	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		79.4	77.8	79.3	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		80.5	79.7	80.1	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		65.6	55.7	58.1	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		86.9	84.1	84.8	----	----
Anthracene-d10	1719-06-8	0.5	%		86.4	83.8	84.7	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		78.5	76.1	76.0	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		94.2	98.0	95.5	----	----
Toluene-D8	2037-26-5	0.2	%		97.5	98.1	100	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		104	102	101	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				RB104	----	----	----	----
Client sampling date / time				04-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1826279-007	-----	-----	-----	-----
				Result	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	0.002	----	----	----	----
Copper	7440-50-8	0.001	mg/L	0.003	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.008	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB104	----	----	----	----
				Client sampling date / time	04-Sep-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1826279-007	-----	-----	-----	-----
				Result		----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		103	----	----	----	----
Toluene-D8	2037-26-5	2	%		97.2	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		100	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: SOIL		
Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH03_0.0 - 31-Aug-2018 00:00	Mid brown sandy soil.
EA200: Description	BH05_0.0 - 04-Sep-2018 00:00	Mid brown sandy soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order	: ES1826279	Page	: 1 of 12
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Contact	: Customer Services ES
Address	: LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9478 3900	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 05-Sep-2018
Order number	:	Date Analysis Commenced	: 07-Sep-2018
C-O-C number	: ----	Issue Date	: 13-Sep-2018
Sampler	: SL		
Site	: St Leonards Top Spring		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 7		
No. of samples analysed	: 4		



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

This 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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW



General Comments

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

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

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

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

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**

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 (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1919620)									
ES1826174-003	Anonymous	EA055: Moisture Content	----	0.1	%	4.4	4.5	0.00	0% - 20%
ES1826215-004	Anonymous	EA055: Moisture Content	----	0.1	%	27.6	28.6	3.58	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1923629)									
ES1826128-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	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	6	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	11	42.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	56	55	0.00	0% - 50%
ES1826285-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	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	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	8	18.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	14	13	7.89	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1923630)									
ES1826128-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1826285-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 1919662)									
ES1826279-004	BH05_0.0	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 1919661)									
ES1826279-004	BH05_0.0	EP068: alpha-BHC	319-84-6	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: 1919661) - continued									
ES1826279-004	BH05_0.0	EP068: Hexachlorobenzene (HCB)	118-74-1	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: gamma-BHC	58-89-9	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: Heptachlor	76-44-8	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: Heptachlor epoxide	1024-57-3	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: alpha-Endosulfan	959-98-8	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: Dieldrin	60-57-1	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: Endrin	72-20-8	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: 4,4`-DDD	72-54-8	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
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	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: 1919661)									
ES1826279-004	BH05_0.0	EP068: Dichlorvos	62-73-7	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: Dimethoate	60-51-5	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: Chlorpyrifos-methyl	5598-13-0	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: Fenthion	55-38-9	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: Pirimphos-ethyl	23505-41-1	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: Bromophos-ethyl	4824-78-6	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: Prothiofos	34643-46-4	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: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	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-methyl	298-00-0	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



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: 1919659)									
ES1826279-004	BH05_0.0	EP075(SIM): Naphthalene	91-20-3	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): Acenaphthene	83-32-9	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): Phenanthrene	85-01-8	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): Fluoranthene	206-44-0	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): Benz(a)anthracene	56-55-3	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): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	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): Indeno(1.2.3.cd)pyrene	193-39-5	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): Benzo(g,h,i)perylene	191-24-2	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
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1919660)							
ES1826279-004	BH05_0.0	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 Petroleum Hydrocarbons (QC Lot: 1919954)									
ES1826279-001	BH03_0.0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1826290-006	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	79	76	3.17	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1919660)									
ES1826279-004	BH05_0.0	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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1919954)									
ES1826279-001	BH03_0.0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1826290-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	157	151	4.38	0% - 50%
EP080: BTEXN (QC Lot: 1919954)									
ES1826279-001	BH03_0.0	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Page : 5 of 12
 Work Order : ES1826279
 Client : GOLDER ASSOCIATES
 Project : 18105360



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: BTEXN (QC Lot: 1919954) - continued									
ES1826279-001	BH03_0.0	EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1826290-006	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	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	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	1.1	1.1	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 (%)
EG020T: Total Metals by ICP-MS (QC Lot: 1921621)									
ES1826266-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.008	30.1	No Limit
ES1826264-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1920498)									
ES1826148-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1826265-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1921388)									
ES1826148-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1826325-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1921388)									
ES1826148-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1826325-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1921388)									
ES1826148-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit

Page : 6 of 12
 Work Order : ES1826279
 Client : GOLDER ASSOCIATES
 Project : 18105360



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 (%)
EP080: BTEXN (QC Lot: 1921388) - continued									
ES1826148-001	Anonymous	EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1826325-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

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 Spike (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.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Result				
<5	21.7 mg/kg	106	86	126
<1	4.64 mg/kg	100	83	113
<2	43.9 mg/kg	114	76	128
<5	32 mg/kg	97.5	86	120
<5	40 mg/kg	105	80	114
<2	55 mg/kg	111	87	123
<5	60.8 mg/kg	120	80	122
<0.1	2.57 mg/kg	78.6	70	105
<0.1	1 mg/kg	104	62	126
<0.05	0.5 mg/kg	94.8	69	113
<0.05	0.5 mg/kg	93.5	65	117
<0.05	0.5 mg/kg	95.1	67	119
<0.05	0.5 mg/kg	96.6	68	116
<0.05	0.5 mg/kg	96.2	65	117
<0.05	0.5 mg/kg	94.5	67	115
<0.05	0.5 mg/kg	92.8	69	115
<0.05	0.5 mg/kg	95.4	62	118
<0.05	0.5 mg/kg	95.0	63	117
<0.05	0.5 mg/kg	104	66	116
<0.05	0.5 mg/kg	96.9	64	116
<0.05	0.5 mg/kg	99.2	66	116
<0.05	0.5 mg/kg	93.6	67	115
<0.05	0.5 mg/kg	96.2	67	123
<0.05	0.5 mg/kg	98.6	69	115
<0.05	0.5 mg/kg	99.0	69	121
<0.05	0.5 mg/kg	102	56	120
<0.05	0.5 mg/kg	102	62	124
<0.2	0.5 mg/kg	102	66	120
<0.05	0.5 mg/kg	104	64	122
<0.2	0.5 mg/kg	96.5	54	130



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 1919661) - continued								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	74.6	59	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.3	62	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	75.6	54	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	82.5	67	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.9	70	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	91.0	72	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	87.6	68	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	68	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	69	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	76	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	90.6	64	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.9	70	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	69	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	66	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.6	68	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	95.0	62	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.0	68	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	65	127
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	67.4	41	123
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1919659)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	111	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	106	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	108	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	108	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	111	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	113	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	113	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	117	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	102	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	107	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	105	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	105	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	84.5	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	87.6	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	78.9	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1919660)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	93.6	75	129



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1919660) - continued								
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	101	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	91.6	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1919954)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	88.3	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1919660)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	95.6	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	98.8	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	75.6	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1919954)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	93.6	68	128
EP080: BTEXN (QCLot: 1919954)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	96.4	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	97.4	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	98.2	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	95.9	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	99.8	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	104	63	119

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG020T: Total Metals by ICP-MS (QCLot: 1921621)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	92.7	82	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	94.8	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.9	86	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.3	83	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.8	85	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.9	84	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.8	79	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1920498)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.9	77	111
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1919113)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	101	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	88.1	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	99.6	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1921388)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	98.6	75	127



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1919113)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	91.8	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	90.6	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	94.1	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1921388)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.7	75	127
EP080: BTEXN (QCLot: 1921388)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	98.6	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.9	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	95.8	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	96.0	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	100	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	70	120

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**

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
EG005T: Total Metals by ICP-AES (QCLot: 1923629)							
ES1826128-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.6	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	95.3	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	95.1	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.0	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	98.2	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	105	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1923630)							
ES1826128-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	73.6	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 1919662)							
ES1826279-004	BH05_0.0	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	109	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 1919661)							
ES1826279-004	BH05_0.0	EP068: gamma-BHC	58-89-9	0.5 mg/kg	106	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	94.4	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	102	70	130

Page : 12 of 12
 Work Order : ES1826279
 Client : GOLDER ASSOCIATES
 Project : 18105360



Sub-Matrix: **WATER**

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
EG020T: Total Metals by ICP-MS (QCLot: 1921621) - continued							
ES1826257-001	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	94.7	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.4	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	113	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	96.3	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	120	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	97.2	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	93.2	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1920498)							
ES1826191-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	85.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1921388)							
ES1826148-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	113	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1921388)							
ES1826148-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	116	70	130
EP080: BTEXN (QCLot: 1921388)							
ES1826148-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	113	70	130
		EP080: Toluene	108-88-3	25 µg/L	106	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	115	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	112	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	116	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	102	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1826279	Page	: 1 of 8
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 05-Sep-2018
Site	: St Leonards Top Spring	Issue Date	: 13-Sep-2018
Sampler	: SL	No. of samples received	: 7
Order number	:	No. of samples analysed	: 4

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: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) BH05_0.0	04-Sep-2018	----	----	----	07-Sep-2018	18-Sep-2018	✓
Soil Glass Jar - Unpreserved (EA055) BH03_0.0, BH03_0.95	31-Aug-2018	----	----	----	07-Sep-2018	14-Sep-2018	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200) BH05_0.0	04-Sep-2018	----	----	----	07-Sep-2018	03-Mar-2019	✓
Snap Lock Bag: Separate bag received (EA200) BH03_0.0	31-Aug-2018	----	----	----	07-Sep-2018	27-Feb-2019	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) BH05_0.0	04-Sep-2018	10-Sep-2018	03-Mar-2019	✓	10-Sep-2018	03-Mar-2019	✓
Soil Glass Jar - Unpreserved (EG005T) BH03_0.0, BH03_0.95	31-Aug-2018	10-Sep-2018	27-Feb-2019	✓	10-Sep-2018	27-Feb-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) BH05_0.0	04-Sep-2018	10-Sep-2018	02-Oct-2018	✓	11-Sep-2018	02-Oct-2018	✓
Soil Glass Jar - Unpreserved (EG035T) BH03_0.0, BH03_0.95	31-Aug-2018	10-Sep-2018	28-Sep-2018	✓	11-Sep-2018	28-Sep-2018	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	11-Sep-2018	17-Oct-2018	✓



Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	11-Sep-2018	17-Oct-2018	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	11-Sep-2018	17-Oct-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	10-Sep-2018	17-Oct-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH03_0.0, BH03_0.95	31-Aug-2018	07-Sep-2018	14-Sep-2018	✓	10-Sep-2018	17-Oct-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	10-Sep-2018	18-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH03_0.0, BH03_0.95	31-Aug-2018	07-Sep-2018	14-Sep-2018	✓	10-Sep-2018	14-Sep-2018	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	10-Sep-2018	18-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH03_0.0, BH03_0.95	31-Aug-2018	07-Sep-2018	14-Sep-2018	✓	10-Sep-2018	14-Sep-2018	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080) BH05_0.0	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	10-Sep-2018	18-Sep-2018	✓
Soil Glass Jar - Unpreserved (EP080) BH03_0.0, BH03_0.95	31-Aug-2018	07-Sep-2018	14-Sep-2018	✓	10-Sep-2018	14-Sep-2018	✓

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-T) RB104	04-Sep-2018	08-Sep-2018	03-Mar-2019	✓	08-Sep-2018	03-Mar-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035T) RB104	04-Sep-2018	----	----	----	07-Sep-2018	02-Oct-2018	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071) RB104	04-Sep-2018	08-Sep-2018	11-Sep-2018	✓	10-Sep-2018	18-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB104	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	07-Sep-2018	18-Sep-2018	✓

Page : 4 of 8
 Work Order : ES1826279
 Client : GOLDER ASSOCIATES
 Project : 18105360



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071) RB104	04-Sep-2018	08-Sep-2018	11-Sep-2018	✓	10-Sep-2018	18-Oct-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB104	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	07-Sep-2018	18-Sep-2018	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) RB104	04-Sep-2018	07-Sep-2018	18-Sep-2018	✓	07-Sep-2018	18-Sep-2018	✓



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	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	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	1	3	33.33	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	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	3	33.33	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	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	3	33.33	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)							
PAH/Phenols (SIM)	EP075(SIM)	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	33.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	1	100.00	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	3	33.33	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: **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	



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)							
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	14	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	10	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	14	7.14	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	10	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	5.26	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
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 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
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)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(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 SnCl ₂ 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)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D 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	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. 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	In house: Referenced to 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. Compliant with NEPM amended 2013.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. 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.
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(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 unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ 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)



Analytical Methods	Method	Matrix	Method Descriptions
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to 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)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to 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
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to 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.
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE CHAIN OF CUSTODY DOCUMENTATION

14/9/18

Sheet 1 of 1

Project No: 18105360		Lab Name: ALS		GOLDER ASSOCIATES PTY LTD	
Site Location: St Leonards Top Spring		Quote No: EN/002/17		124 Pacific Highway, Greenwich	
Sampled By: RB		Order No:		Project Manager: Rita Bonetti	
Turnaround Time: 24hrs ☐ 48hrs ☐ Standard ☒		Date Required By:		Job Contact: Rita Bonetti	
Delivery Option: HARD ☐ FAX ☐ DISK ☐ EMAIL ☒ BULLETIN BOARD ☐		ANALYSIS REQUIRED			
Report Format: PDF ☒ EXCEL ☒ ESDAT ☒					

Comments/Special Instructions: ***TAT for pH + EC ***

LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	NO CONTAINERS	Level of Contamination (Low/High/Unknown)	HOLD	W10 - TPH / BTEXN / PAHS / VOCs	W2 - 8 metals (dissolved)	Extra volume for lab QAQC	EA010 - Conductivity	EA005 - pH	NT-2 (Major Anions - Chloride, sulfate, alkalinity)	Subcon / Forward Lab / Split WO	Lab / Analysis:	Organised By / Date:	Relinquished By / Date:	Connote / Courier:	WO No:	Attached By PO / Internal Sheet:
1	BH02 180910	13:20	10/09/2018		Water	5	U		x	x						SGS / QCB200					
2	BH05 180910	14:10	10/09/2018		Water	9	U		x	x	x	x	x	x							
3	BH07 180910	15:25	10/09/2018		Water	7	U		x	x		x	x	x							
4	QCA200	-	10/09/2018		Water	5	U		x	x											
5	QCB200	-	10/09/2018		Water	5	U		x	x											

TAT HT

Environmental Division
Sydney
Work Order Reference
ES1826717



Telephone : + 61-2-8784 8555

SAMPLE MATRIX = Soil/Sediment/Fill/Water/Other				SAMPLE TYPE = Composite(C)/Discrete(DC)/Disturbed(DS)/Core(CR), Grab Sample (GS)				HIGH CONCENTRATION: circle expected parameters in analysis list									
SIGNATURE		COMPANY		DATE		TIME		SIGNATURE		COMPANY		DATE		TIME		Method of Shipment	
RELEASED BY: <i>[Signature]</i>		Golder Associates		10/9/18		3:30pm		RELEASED BY:								Shipping Ref:	
RECEIVED BY: <i>[Signature]</i>		ALS - Crown Nest		10/9/18		1545		RECEIVED BY:									
RELEASED BY:								To Be Filled Out By Analysing Laboratory		LAB BATCH NUMBER							
RECEIVED BY: ANDREW				10/9/18		7:29pm		Security Seal		☒		Chilled		☒		BIT to:	
RELEASED BY:								Suitable Containers		☒		Frozen		☐		Address:	
RECEIVED BY:								Cool Box		☒		Ambient		☐		4.2°C	

SP 14/9

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1826717**

Amendment : **1**

Client : **GOLDER ASSOCIATES**
Contact : **MS RITA BONETTI**
Address : **LEVEL 1, 124 PACIFIC HIGHWAY**
ST LEONARDS NSW, AUSTRALIA
2065

Laboratory : **Environmental Division Sydney**
Contact : **Customer Services ES**
Address : **277-289 Woodpark Road Smithfield**
NSW Australia 2164

E-mail : **RBonetti@golder.com.au**
Telephone : **+61 02 9478 3900**
Facsimile : **+61 02 9478 3901**

E-mail : **ALSEnviro.Sydney@alsglobal.com**
Telephone : **+61-2-8784 8555**
Facsimile : **+61-2-8784 8500**

Project : **18105360**

Page : **1 of 2**

Order number :

Quote number : **EM2017GOLASS0027 (EN/002/18**
National BQ)

C-O-C number : **----**

QC Level : **NEPM 2013 B3 & ALS QC Standard**

Site : **St Leonards Top Spring**

Sampler : **RB**

Dates

Date Samples Received : **10-Sep-2018 17:56**

Issue Date : **19-Sep-2018**

Client Requested Due : **14-Sep-2018**

Scheduled Reporting Date : **14-Sep-2018**

Date

Delivery Details

Mode of Delivery : **Undefined**

Security Seal : **Not Available**

No. of coolers/boxes : **1**

Temperature : **4.2°C - Ice present**

Receipt Detail :

No. of samples received / analysed : **4 / 4**

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
- **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.**
- **(19/09/18) This is an update SRN which shows a change in identification for sample 002 to 'BH04_180910'.**
- 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 (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

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.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005P pH (PCT)	WATER - EA010P Electrical Conductivity (PCT)	WATER - EP074 (water) Volatile Organic Compounds	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)	WATER - W-02 8 Metals	WATER - W-07 TRH/TEXN/PAH
ES1826717-001	10-Sep-2018 00:00	BH02_180910			✓		✓	✓
ES1826717-002	10-Sep-2018 00:00	BH04_180910	✓	✓	✓	✓	✓	✓
ES1826717-003	10-Sep-2018 00:00	BH07_180910	✓	✓	✓	✓	✓	✓
ES1826717-004	10-Sep-2018 00:00	QCA200			✓		✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email au_accountspayable@golder.com.au

RITA BONETTI

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)

Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au

CERTIFICATE OF ANALYSIS

Work Order	: ES1826717	Page	: 1 of 8
Amendment	: 1		
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Contact	: Customer Services ES
Address	: LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9478 3900	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 10-Sep-2018 17:56
Order number	:	Date Analysis Commenced	: 10-Sep-2018
C-O-C number	: ----	Issue Date	: 19-Sep-2018 14:28
Sampler	: RB		
Site	: St Leonards Top Spring		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 4		
No. of samples analysed	: 4		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

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

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

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

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

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

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

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

- Amendment (19/09/2018): This report has been amended and re-released to allow a change in identification for sample 002 to 'BH04_180910'. All analysis results are as per the previous report.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH02_180910	BH04_180910	BH07_180910	QCA200	----
Client sampling date / time					10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit		ES1826717-001	ES1826717-002	ES1826717-003	ES1826717-004	-----
					Result	Result	Result	Result	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		----	6.27	6.06	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		----	751	996	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		----	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		----	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		----	79	65	----	----
Total Alkalinity as CaCO3	----	1	mg/L		----	79	65	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		----	38	30	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		----	171	280	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	0.001	----
Copper	7440-50-8	0.001	mg/L		0.022	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L		0.015	0.006	0.012	0.006	----
Lead	7439-92-1	0.001	mg/L		0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		0.096	0.006	0.034	0.006	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
EP074A: Monocyclic Aromatic Hydrocarbons									
Styrene	100-42-5	5	µg/L		<5	<5	<5	<5	----
Isopropylbenzene	98-82-8	5	µg/L		<5	<5	<5	<5	----
n-Propylbenzene	103-65-1	5	µg/L		<5	<5	<5	<5	----
1,3,5-Trimethylbenzene	108-67-8	5	µg/L		<5	<5	<5	<5	----
sec-Butylbenzene	135-98-8	5	µg/L		<5	<5	<5	<5	----
1,2,4-Trimethylbenzene	95-63-6	5	µg/L		<5	<5	<5	<5	----
tert-Butylbenzene	98-06-6	5	µg/L		<5	<5	<5	<5	----
p-Isopropyltoluene	99-87-6	5	µg/L		<5	<5	<5	<5	----
n-Butylbenzene	104-51-8	5	µg/L		<5	<5	<5	<5	----
EP074B: Oxygenated Compounds									
Vinyl Acetate	108-05-4	50	µg/L		<50	<50	<50	<50	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH02_180910	BH04_180910	BH07_180910	QCA200	----
Client sampling date / time					10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit		ES1826717-001	ES1826717-002	ES1826717-003	ES1826717-004	-----
					Result	Result	Result	Result	----
EP074B: Oxygenated Compounds - Continued									
2-Butanone (MEK)	78-93-3	50	µg/L		<50	<50	<50	<50	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L		<50	<50	<50	<50	----
2-Hexanone (MBK)	591-78-6	50	µg/L		<50	<50	<50	<50	----
EP074C: Sulfonated Compounds									
Carbon disulfide	75-15-0	5	µg/L		<5	<5	<5	<5	----
EP074D: Fumigants									
2,2-Dichloropropane	594-20-7	5	µg/L		<5	<5	<5	<5	----
1,2-Dichloropropane	78-87-5	5	µg/L		<5	<5	<5	<5	----
cis-1,3-Dichloropropylene	10061-01-5	5	µg/L		<5	<5	<5	<5	----
trans-1,3-Dichloropropylene	10061-02-6	5	µg/L		<5	<5	<5	<5	----
1,2-Dibromoethane (EDB)	106-93-4	5	µg/L		<5	<5	<5	<5	----
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	75-71-8	50	µg/L		<50	<50	<50	<50	----
Chloromethane	74-87-3	50	µg/L		<50	<50	<50	<50	----
Vinyl chloride	75-01-4	50	µg/L		<50	<50	<50	<50	----
Bromomethane	74-83-9	50	µg/L		<50	<50	<50	<50	----
Chloroethane	75-00-3	50	µg/L		<50	<50	<50	<50	----
Trichlorofluoromethane	75-69-4	50	µg/L		<50	<50	<50	<50	----
1,1-Dichloroethene	75-35-4	5	µg/L		<5	<5	<5	<5	----
Iodomethane	74-88-4	5	µg/L		<5	<5	<5	<5	----
trans-1,2-Dichloroethene	156-60-5	5	µg/L		<5	<5	<5	<5	----
1,1-Dichloroethane	75-34-3	5	µg/L		<5	<5	<5	<5	----
cis-1,2-Dichloroethene	156-59-2	5	µg/L		<5	<5	<5	<5	----
1,1,1-Trichloroethane	71-55-6	5	µg/L		<5	<5	<5	<5	----
1,1-Dichloropropylene	563-58-6	5	µg/L		<5	<5	<5	<5	----
Carbon Tetrachloride	56-23-5	5	µg/L		<5	<5	<5	<5	----
1,2-Dichloroethane	107-06-2	5	µg/L		<5	<5	<5	<5	----
Trichloroethene	79-01-6	5	µg/L		<5	<5	<5	<5	----
Dibromomethane	74-95-3	5	µg/L		<5	<5	<5	<5	----
1,1,2-Trichloroethane	79-00-5	5	µg/L		<5	<5	<5	<5	----
1,3-Dichloropropane	142-28-9	5	µg/L		<5	<5	<5	<5	----
Tetrachloroethene	127-18-4	5	µg/L		<5	<5	<5	<5	----
1,1,1,2-Tetrachloroethane	630-20-6	5	µg/L		<5	<5	<5	<5	----
trans-1,4-Dichloro-2-butene	110-57-6	5	µg/L		<5	<5	<5	<5	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				BH02_180910	BH04_180910	BH07_180910	QCA200	----
Client sampling date / time				10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1826717-001	ES1826717-002	ES1826717-003	ES1826717-004	-----
				Result	Result	Result	Result	----
EP074E: Halogenated Aliphatic Compounds - Continued								
cis-1,4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	<5	<5	----
1,1,2,2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	<5	<5	----
1,2,3-Trichloropropane	96-18-4	5	µg/L	<5	<5	<5	<5	----
Pentachloroethane	76-01-7	5	µg/L	<5	<5	<5	<5	----
1,2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	<5	<5	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	<5	<5	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	<5	<5	<5	----
Bromobenzene	108-86-1	5	µg/L	<5	<5	<5	<5	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	<5	<5	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	<5	<5	----
1,3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	<5	<5	----
1,4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	<5	<5	----
1,2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	<5	<5	----
1,2,4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	<5	<5	----
1,2,3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	<5	<5	----
EP074G: Trihalomethanes								
Chloroform	67-66-3	5	µg/L	<5	<5	<5	<5	----
Bromodichloromethane	75-27-4	5	µg/L	<5	<5	<5	<5	----
Dibromochloromethane	124-48-1	5	µg/L	<5	<5	<5	<5	----
Bromoform	75-25-2	5	µg/L	<5	<5	<5	<5	----
EP074H: Naphthalene								
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	BH02_180910	BH04_180910	BH07_180910	QCA200	----
Client sampling date / time				10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1826717-001	ES1826717-002	ES1826717-003	ES1826717-004	-----	
				Result	Result	Result	Result	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----	
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
^ Sum of polycyclic aromatic hydrocarbons		----	0.5	µg/L	<0.5	<0.5	<0.5	----	
^ Benzo(a)pyrene TEQ (zero)		----	0.5	µg/L	<0.5	<0.5	<0.5	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
C15 - C28 Fraction	----	100	µg/L	230	180	1080	180	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----	
^ C10 - C36 Fraction (sum)		----	50	µg/L	230	180	1080	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----	
^ C6 - C10 Fraction minus BTEX (F1)		C6_C10-BTEX	20	µg/L	<20	<20	<20	----	
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
>C16 - C34 Fraction	----	100	µg/L	230	180	1060	180	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----	
^ >C10 - C40 Fraction (sum)		----	100	µg/L	230	180	1060	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)		----	100	µg/L	<100	<100	<100	----	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----	
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----	
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----	
^ Total Xylenes		----	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	<5	----	
EP074S: VOC Surrogates									



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				BH02_180910	BH04_180910	BH07_180910	QCA200	----
Client sampling date / time				10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	10-Sep-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1826717-001	ES1826717-002	ES1826717-003	ES1826717-004	-----
				Result	Result	Result	Result	----
EP074S: VOC Surrogates - Continued								
1,2-Dichloroethane-D4	17060-07-0	5	%	110	107	108	107	----
Toluene-D8	2037-26-5	5	%	98.2	98.0	100	101	----
4-Bromofluorobenzene	460-00-4	5	%	94.7	95.5	93.5	96.0	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	25.6	25.1	19.6	21.4	----
2-Chlorophenol-D4	93951-73-6	1.0	%	59.7	67.9	66.1	68.7	----
2,4,6-Tribromophenol	118-79-6	1.0	%	51.3	49.5	50.7	69.2	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	83.3	76.6	85.3	76.0	----
Anthracene-d10	1719-06-8	1.0	%	96.6	80.0	94.7	98.5	----
4-Terphenyl-d14	1718-51-0	1.0	%	98.2	98.6	86.8	86.2	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	119	117	117	116	----
Toluene-D8	2037-26-5	2	%	105	105	107	108	----
4-Bromofluorobenzene	460-00-4	2	%	103	104	102	105	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP074S: VOC Surrogates			
1,2-Dichloroethane-D4	17060-07-0	78	133
Toluene-D8	2037-26-5	79	129
4-Bromofluorobenzene	460-00-4	81	124
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2,4,6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

QUALITY CONTROL REPORT

Work Order : **ES1826717**

Page : 1 of 11

Amendment : **1**

Client : **GOLDER ASSOCIATES**
Contact : **MS RITA BONETTI**
Address : **LEVEL 1, 124 PACIFIC HIGHWAY**
ST LEONARDS NSW, AUSTRALIA 2065
Telephone : **+61 02 9478 3900**
Project : **18105360**
Order number :
C-O-C number : **----**
Sampler : **RB**
Site : **St Leonards Top Spring**
Quote number : **EN/002/18 National BQ**
No. of samples received : **4**
No. of samples analysed : **4**

Laboratory : **Environmental Division Sydney**
Contact : **Customer Services ES**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61-2-8784 8555**
Date Samples Received : **10-Sep-2018**
Date Analysis Commenced : **10-Sep-2018**
Issue Date : **19-Sep-2018**



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

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

This 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

Signatories

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

Signatories	Position	Accreditation Category
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

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

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

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

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

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: **WATER**

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 (%)
EA005P: pH by PC Titrator (QC Lot: 1923993)									
EW1803602-006	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.51	6.49	0.308	0% - 20%
EW1803602-002	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.48	6.51	0.462	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1923989)									
ES1826633-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	14100	14200	0.460	0% - 20%
ES1826684-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1440	1440	0.00	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1923994)									
EW1803602-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	267	265	0.777	0% - 20%
EW1803639-008	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	130	130	0.00	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1923991)									
ES1826677-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	30	30	0.00	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	274	291	5.91	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	304	321	5.27	0% - 20%
ES1826684-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	145	145	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	145	145	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 1927433)									
ES1826717-003	BH07_180910	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	30	31	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 1927432)									
ES1826558-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.00	No Limit
ES1826717-003	BH07_180910	ED045G: Chloride	16887-00-6	1	mg/L	280	281	0.373	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1928581)									
ES1826710-015	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit



Sub-Matrix: **WATER**

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: 1928581) - continued									
ES1826710-015	Anonymous	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	<0.001	<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	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	0.00	No Limit
ES1826710-025	Anonymous	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
		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	<0.001	<0.001	0.00	No Limit
EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	0.012	0.00	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 1928582)									
ES1826710-018	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1826714-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP074A: Monocyclic Aromatic Hydrocarbons (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Styrene	100-42-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,3,5-Trimethylbenzene	108-67-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2,4-Trimethylbenzene	95-63-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	<5	0.00	No Limit
EP074B: Oxygenated Compounds (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	<50	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	<50	0.00	No Limit
EP074C: Sulfonated Compounds (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Carbon disulfide	75-15-0	5	µg/L	<5	<5	0.00	No Limit
EP074D: Fumigants (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: 2,2-Dichloropropane	594-20-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2-Dichloropropane	78-87-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1,3-Dichloropropylene	10061-01-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1,3-Dichloropropylene	10061-02-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	<5	0.00	No Limit



Sub-Matrix: **WATER**

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 (%)
EP074E: Halogenated Aliphatic Compounds (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: 1,1-Dichloroethene	75-35-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Iodomethane	74-88-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1,2-Dichloroethene	156-60-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1-Dichloroethane	75-34-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1,2-Dichloroethene	156-59-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1,1-Trichloroethane	71-55-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1-Dichloropropylene	563-58-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2-Dichloroethane	107-06-2	5	µg/L	<5	<5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1,2-Trichloroethane	79-00-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,3-Dichloropropane	142-28-9	5	µg/L	<5	<5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1,1,2-Tetrachloroethane	630-20-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: trans-1,4-Dichloro-2-butene	110-57-6	5	µg/L	<5	<5	0.00	No Limit
		EP074: cis-1,4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,1,2,2-Tetrachloroethane	79-34-5	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2,3-Trichloropropane	96-18-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Pentachloroethane	76-01-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloromethane	74-87-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	50	µg/L	<50	<50	0.00	No Limit
		EP074: Bromomethane	74-83-9	50	µg/L	<50	<50	0.00	No Limit
		EP074: Chloroethane	75-00-3	50	µg/L	<50	<50	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	<50	0.00	No Limit
EP074F: Halogenated Aromatic Compounds (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Chlorobenzene	108-90-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	<5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,3-Dichlorobenzene	541-73-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,4-Dichlorobenzene	106-46-7	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2-Dichlorobenzene	95-50-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: 1,2,4-Trichlorobenzene	120-82-1	5	µg/L	<5	<5	0.00	No Limit
EP074: 1,2,3-Trichlorobenzene	87-61-6	5	µg/L	<5	<5	0.00	No Limit		
EP074G: Trihalomethanes (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Chloroform	67-66-3	5	µg/L	<5	<5	0.00	No Limit



Sub-Matrix: **WATER**

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 (%)
EP074G: Trihalomethanes (QC Lot: 1927409) - continued									
ES1826717-001	BH02_180910	EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	<5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	<5	0.00	No Limit
		EP074: Bromoform	75-25-2	5	µg/L	<5	<5	0.00	No Limit
EP074H: Naphthalene (QC Lot: 1927409)									
ES1826717-001	BH02_180910	EP074: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1924684)									
ES1826717-002	BH04_180910	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	<1.0	0.00	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	0.00	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	0.00	No Limit
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	0.00	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1924685)									
ES1826717-004	QCA200	EP071: C15 - C28 Fraction	----	100	µg/L	180	150	16.6	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
ES1826717-002	BH04_180910	EP071: C15 - C28 Fraction	----	100	µg/L	180	180	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1927408)									
ES1826818-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1826717-001	BH02_180910	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1924685)									
ES1826717-004	QCA200	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	180	140	25.6	No Limit
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
ES1826717-002	BH04_180910	EP071: >C10 - C16 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	180	180	0.00	No Limit

Page : 6 of 11
 Work Order : ES1826717 Amendment 1
 Client : GOLDER ASSOCIATES
 Project : 18105360



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 (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1924685) - continued									
ES1826717-002	BH04_180910	EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1927408)									
ES1826818-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1826717-001	BH02_180910	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1927408)									
ES1826818-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES1826717-001	BH02_180910	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	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	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	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 Spike (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: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EA010P: Conductivity by PC Titrator (QCLot: 1923989)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	103	95	113
EA010P: Conductivity by PC Titrator (QCLot: 1923994)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	106	95	113
ED037P: Alkalinity by PC Titrator (QCLot: 1923991)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	92.7	81	111
				----	50 mg/L	88.8	70	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1927433)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	98.4	82	122
ED045G: Chloride by Discrete Analyser (QCLot: 1927432)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	108	81	127
				<1	1000 mg/L	104	81	127
EG020F: Dissolved Metals by ICP-MS (QCLot: 1928581)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	93.9	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.1	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	85.0	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.0	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.6	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	88.0	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 1928582)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	96.1	83	105
EP074A: Monocyclic Aromatic Hydrocarbons (QCLot: 1927409)								
EP074: Styrene	100-42-5	5	µg/L	<5	10 µg/L	98.0	73	119
EP074: Isopropylbenzene	98-82-8	5	µg/L	<5	10 µg/L	99.6	76	118
EP074: n-Propylbenzene	103-65-1	5	µg/L	<5	10 µg/L	102	69	119
EP074: 1,3,5-Trimethylbenzene	108-67-8	5	µg/L	<5	10 µg/L	99.5	74	116
EP074: sec-Butylbenzene	135-98-8	5	µg/L	<5	10 µg/L	99.3	73	119
EP074: 1,2,4-Trimethylbenzene	95-63-6	5	µg/L	<5	10 µg/L	101	74	116
EP074: tert-Butylbenzene	98-06-6	5	µg/L	<5	10 µg/L	99.7	72	116
EP074: p-Isopropyltoluene	99-87-6	5	µg/L	<5	10 µg/L	100	71	119
EP074: n-Butylbenzene	104-51-8	5	µg/L	<5	10 µg/L	97.2	65	123
EP074B: Oxygenated Compounds (QCLot: 1927409)								
EP074: Vinyl Acetate	108-05-4	50	µg/L	<50	100 µg/L	95.9	61	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP074B: Oxygenated Compounds (QCLot: 1927409) - continued								
EP074: 2-Butanone (MEK)	78-93-3	50	µg/L	<50	100 µg/L	93.2	74	130
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	100 µg/L	92.6	66	132
EP074: 2-Hexanone (MBK)	591-78-6	50	µg/L	<50	100 µg/L	93.8	65	137
EP074C: Sulfonated Compounds (QCLot: 1927409)								
EP074: Carbon disulfide	75-15-0	5	µg/L	<5	10 µg/L	101	73	127
EP074D: Fumigants (QCLot: 1927409)								
EP074: 2,2-Dichloropropane	594-20-7	5	µg/L	<5	10 µg/L	103	68	122
EP074: 1,2-Dichloropropane	78-87-5	5	µg/L	<5	10 µg/L	95.9	76	118
EP074: cis-1,3-Dichloropropylene	10061-01-5	5	µg/L	<5	10 µg/L	94.9	62	120
EP074: trans-1,3-Dichloropropylene	10061-02-6	5	µg/L	<5	10 µg/L	94.5	60	114
EP074: 1,2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	10 µg/L	99.4	69	117
EP074E: Halogenated Aliphatic Compounds (QCLot: 1927409)								
EP074: Dichlorodifluoromethane	75-71-8	50	µg/L	<50	100 µg/L	108	61	138
EP074: Chloromethane	74-87-3	50	µg/L	<50	100 µg/L	124	67	130
EP074: Vinyl chloride	75-01-4	50	µg/L	<50	100 µg/L	115	69	129
EP074: Bromomethane	74-83-9	50	µg/L	<50	100 µg/L	108	56	140
EP074: Chloroethane	75-00-3	50	µg/L	<50	100 µg/L	112	61	139
EP074: Trichlorofluoromethane	75-69-4	50	µg/L	<50	100 µg/L	110	69	131
EP074: 1,1-Dichloroethene	75-35-4	5	µg/L	<5	10 µg/L	99.2	70	124
EP074: Iodomethane	74-88-4	5	µg/L	<5	10 µg/L	74.3	70	128
EP074: trans-1,2-Dichloroethene	156-60-5	5	µg/L	<5	10 µg/L	113	74	118
EP074: 1,1-Dichloroethane	75-34-3	5	µg/L	<5	10 µg/L	104	74	120
EP074: cis-1,2-Dichloroethene	156-59-2	5	µg/L	<5	10 µg/L	101	77	119
EP074: 1,1,1-Trichloroethane	71-55-6	5	µg/L	<5	10 µg/L	98.4	67	119
EP074: 1,1-Dichloropropylene	563-58-6	5	µg/L	<5	10 µg/L	103	73	119
EP074: Carbon Tetrachloride	56-23-5	5	µg/L	<5	10 µg/L	98.8	62	120
EP074: 1,2-Dichloroethane	107-06-2	5	µg/L	<5	10 µg/L	100	73	123
EP074: Trichloroethene	79-01-6	5	µg/L	<5	10 µg/L	102	76	118
EP074: Dibromomethane	74-95-3	5	µg/L	<5	10 µg/L	98.4	73	119
EP074: 1,1,2-Trichloroethane	79-00-5	5	µg/L	<5	10 µg/L	102	72	126
EP074: 1,3-Dichloropropane	142-28-9	5	µg/L	<5	10 µg/L	104	71	129
EP074: Tetrachloroethene	127-18-4	5	µg/L	<5	10 µg/L	96.6	72	124
EP074: 1,1,1,2-Tetrachloroethane	630-20-6	5	µg/L	<5	10 µg/L	95.0	66	114
EP074: trans-1,4-Dichloro-2-butene	110-57-6	5	µg/L	<5	10 µg/L	99.7	60	120
EP074: cis-1,4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	10 µg/L	93.7	71	128
EP074: 1,1,2,2-Tetrachloroethane	79-34-5	5	µg/L	<5	10 µg/L	94.4	70	124
EP074: 1,2,3-Trichloropropane	96-18-4	5	µg/L	<5	10 µg/L	95.1	74	126
EP074: Pentachloroethane	76-01-7	5	µg/L	<5	10 µg/L	96.2	72	126

Method Blank (MB) Report

Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
	LCS	Low	High

Method: Compound	CAS Number	LOR	Unit	Result	Concentration	Upper Recovery (%)	Recovery Range (%)	Low	High
EP074E: Halogenated Aliphatic Compounds (QCLot: 1927409) - continued									
EP074: 1,2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	10 µg/L	94.9		66	136
EP074: Hexachlorobutadiene	87-68-3	5	µg/L	<5	10 µg/L	100		58	130
EP074F: Halogenated Aromatic Compounds (QCLot: 1927409)									
EP074: Chlorobenzene	108-90-7	5	µg/L	<5	10 µg/L	99.8		79	117
EP074: Bromobenzene	108-86-1	5	µg/L	<5	10 µg/L	99.4		76	116
EP074: 2-Chlorotoluene	95-49-8	5	µg/L	<5	10 µg/L	102		73	119
EP074: 4-Chlorotoluene	106-43-4	5	µg/L	<5	10 µg/L	102		73	119
EP074: 1,3-Dichlorobenzene	541-73-1	5	µg/L	<5	10 µg/L	95.0		75	117
EP074: 1,4-Dichlorobenzene	106-46-7	5	µg/L	<5	10 µg/L	100		74	118
EP074: 1,2-Dichlorobenzene	95-50-1	5	µg/L	<5	10 µg/L	99.6		75	117
EP074: 1,2,4-Trichlorobenzene	120-82-1	5	µg/L	<5	10 µg/L	99.0		61	125
EP074: 1,2,3-Trichlorobenzene	87-61-6	5	µg/L	<5	10 µg/L	98.4		67	123
EP074G: Trihalomethanes (QCLot: 1927409)									
EP074: Chloroform	67-66-3	5	µg/L	<5	10 µg/L	97.8		72	120
EP074: Bromodichloromethane	75-27-4	5	µg/L	<5	10 µg/L	97.7		64	118
EP074: Dibromochloromethane	124-48-1	5	µg/L	<5	10 µg/L	90.1		65	115
EP074: Bromoform	75-25-2	5	µg/L	<5	10 µg/L	91.7		74	126
EP074H: Naphthalene (QCLot: 1927409)									
EP074: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	109		72	122
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1924684)									
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.3		50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	98.8		64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	93.7		62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	89.1		64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	96.6		63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	89.9		64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	92.0		64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	94.7		63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	75.0		64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	81.9		63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	79.7		62	119
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	83.9		63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	92.4		63	117
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	85.4		60	118
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	93.6		61	117
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	80.4		59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1924685)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1924685) - continued								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	98.1	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	99.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	81.0	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1927408)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	88.6	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1924685)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	99.2	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	103	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	111	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1927408)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	87.8	75	127
EP080: BTEXN (QCLot: 1927408)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	104	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	86.2	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	87.0	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	86.5	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	88.1	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	90.0	70	120

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: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 1927433)							
ES1826622-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 1927432)							
ES1826558-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	110	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1928581)							
ES1826710-016	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	127	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	128	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	128	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	128	70	130



Sub-Matrix: **WATER**

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
EG020F: Dissolved Metals by ICP-MS (QCLot: 1928581) - continued							
ES1826710-016	Anonymous	EG020A-F: Lead	7439-92-1	1 mg/L	125	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	129	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	129	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1928582)							
ES1826710-017	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	91.3	70	130
EP074E: Halogenated Aliphatic Compounds (QCLot: 1927409)							
ES1826717-001	BH02_180910	EP074: 1,1-Dichloroethene	75-35-4	25 µg/L	91.9	70	130
		EP074: Trichloroethene	79-01-6	25 µg/L	93.1	70	130
EP074F: Halogenated Aromatic Compounds (QCLot: 1927409)							
ES1826717-001	BH02_180910	EP074: Chlorobenzene	108-90-7	25 µg/L	97.2	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1924684)							
ES1826717-002	BH04_180910	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	86.4	70	130
		EP075(SIM): Pyrene	129-00-0	20 µg/L	82.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1924685)							
ES1826717-002	BH04_180910	EP071: C10 - C14 Fraction	----	200 µg/L	118	74	150
		EP071: C15 - C28 Fraction	----	300 µg/L	104	77	153
		EP071: C29 - C36 Fraction	----	200 µg/L	92.1	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1927408)							
ES1826717-001	BH02_180910	EP080: C6 - C9 Fraction	----	325 µg/L	86.2	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1924685)							
ES1826717-002	BH04_180910	EP071: >C10 - C16 Fraction	----	250 µg/L	80.9	74	150
		EP071: >C16 - C34 Fraction	----	350 µg/L	102	77	153
		EP071: >C34 - C40 Fraction	----	150 µg/L	98.0	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1927408)							
ES1826717-001	BH02_180910	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	89.8	70	130
EP080: BTEXN (QCLot: 1927408)							
ES1826717-001	BH02_180910	EP080: Benzene	71-43-2	25 µg/L	104	70	130
		EP080: Toluene	108-88-3	25 µg/L	91.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	92.3	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	92.7	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	95.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	89.9	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1826717	Page	: 1 of 8
Amendment	: 1		
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 10-Sep-2018
Site	: St Leonards Top Spring	Issue Date	: 19-Sep-2018
Sampler	: RB	No. of samples received	: 4
Order number	:	No. of samples analysed	: 4

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.
- Matrix Spike outliers exist - please see following pages for full details.
- 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

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	ES1826622--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P) BH04_180910, BH07_180910	10-Sep-2018	----	----	----	10-Sep-2018	10-Sep-2018	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P) BH04_180910, BH07_180910	10-Sep-2018	----	----	----	10-Sep-2018	08-Oct-2018	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) BH04_180910, BH07_180910	10-Sep-2018	----	----	----	10-Sep-2018	24-Sep-2018	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) BH04_180910, BH07_180910	10-Sep-2018	----	----	----	12-Sep-2018	08-Oct-2018	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) BH04_180910, BH07_180910	10-Sep-2018	----	----	----	12-Sep-2018	08-Oct-2018	✓
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) BH02_180910, BH07_180910, BH04_180910, QCA200	10-Sep-2018	----	----	----	13-Sep-2018	09-Mar-2019	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) BH02_180910, BH07_180910, BH04_180910, QCA200	10-Sep-2018	----	----	----	13-Sep-2018	08-Oct-2018	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP074A: Monocyclic Aromatic Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074B: Oxygenated Compounds								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074C: Sulfonated Compounds								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074D: Fumigants								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074E: Halogenated Aliphatic Compounds								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074F: Halogenated Aromatic Compounds								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074G: Trihalomethanes								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP074H: Naphthalene								
Amber VOC Vial - Sulfuric Acid (EP074) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✓	12-Sep-2018	24-Sep-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM)) BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	11-Sep-2018	17-Sep-2018	✓	13-Sep-2018	21-Oct-2018	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	11-Sep-2018	17-Sep-2018	✔	13-Sep-2018	21-Oct-2018	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✔	12-Sep-2018	24-Sep-2018	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	11-Sep-2018	17-Sep-2018	✔	13-Sep-2018	21-Oct-2018	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✔	12-Sep-2018	24-Sep-2018	✔
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
BH02_180910, BH07_180910,	BH04_180910, QCA200	10-Sep-2018	12-Sep-2018	24-Sep-2018	✔	12-Sep-2018	24-Sep-2018	✔



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: **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)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	11.11	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	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	11.11	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	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	11.11	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	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	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	
Matrix Spikes (MS) - Continued							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	9	11.11	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	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	11.11	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
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
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 0.45µm 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 (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm 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 SnCl ₂ 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)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to 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)
Volatile Organic Compounds	EP074	WATER	In house: Referenced to 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. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to 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)



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to 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)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

Fadi Soro

From: Sepan Mahamad
Sent: Tuesday, 11 September 2018 11:07 AM
To: Fadi Soro; Saman Taeidi
Subject: FW: Additional Analysis - ES1825849

Fadi
11/9/18
12p

Hi gents,

Can you please organise this rebatch? Thanks

Please note that my office hours are 11am – 5.30pm Monday to Friday. For assistance outside of this time please contact ALSEnviro.Sydney@alsglobal.com.

Kind Regards,

Sepan Mahamad

Client Services Officer, Environmental
Sydney



T +61 2 9437 9978
M +61 438 511 003
sepan.mahamad@alsglobal.com
Shop 2, 36 Hume St
Crows Nest NSW 2065 AUSTRALIA

*Subscribe    

We are keen for your feedback! Please click here for your 3 minute survey

EnviroMail™ 00 – All EnviroMails™ in one convenient library.

Recent releases (click to access directly):

EnviroMail™ 121 Dissolved metals | **EnviroMail™ 120** – Microtox | **EnviroMail™ 119** – PFAS in Biota

Right Solutions · Right Partner
www.alsglobal.com

From: Bonetti, Rita [<mailto:RBonetti@golder.com.au>]

Sent: Tuesday, 11 September 2018 08:20

Environmental Division
Sydney
Work Order Reference
ES1826966



Telephone : + 61-2-8784 8565

To: Sepan Mahamad <Sepan.Mahamad@alsglobal.com>; ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Cc: Doyle, Shane <SDoyle@golder.com.au>
Subject: Additional Analysis - ES1825849

S861-862

Good morning,

①

Could you please schedule sample BH08_0.0 (ES1825849-004) for TCLP Lead (EN33 / EG005C) on a standard 5 day TAT?

Thanks,
Rita

Rita Bonetti (BEnvSC (Adv))
Environmental Scientist



GOLDER

Golder Associates Pty Ltd
124 Pacific Highway, St. Leonards, New South Wales 2065, Australia (PO Box 1302, Crows Nest NSW 1585)
T: +61 2 9478 3900 | D: +61 (2) 9478 3906 | M: +61 437 039 929 | golder.com
LinkedIn | Facebook | Twitter

Winner of 27 Financial Review Client Choice Awards

Work Safe, Home Safe

This document contains confidential information and is intended for the use of the individual or entity named in the distribution list. If you are not the named addressee, you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. If you are not the named addressee you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. If you are not the named addressee you should not disseminate, distribute or copy this e-mail. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. limitations

Golder and the Golder logo are trademarks of Golder Associates Pty Ltd.

Please consider the environment before printing this email.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1826966

Client : GOLDER ASSOCIATES Contact : MS RITA BONETTI Address : LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065 E-mail : RBonetti@golder.com.au Telephone : +61 02 9478 3900 Facsimile : +61 02 9478 3901 Project : 18105360 Order number : C-O-C number : ---- Site : St Leonards Top Spring Sampler : SL	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@alsglobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 2 Quote number : EM2017GOLASS0027 (EN/002/18 National BQ) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 11-Sep-2018 12:00 Client Requested Due : 17-Sep-2018 Date :	Issue Date : 12-Sep-2018 Scheduled Reporting Date : 17-Sep-2018
--	--

Delivery Details

Mode of Delivery : Samples On Hand No. of coolers/boxes : ---- Receipt Detail :	Security Seal : Not Available Temperature : 4.1 No. of samples received / analysed : 1 / 1
--	---

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
- **This is a rebatch of ES1825849.**
- **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.**
- 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 (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

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.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EG005C Leachable Metals by ICPAES	SOIL - EN33a TCLP Leachate
ES1826966-001	30-Aug-2018 00:00	BH08_0.0	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)

Email au_accountspayable@golder.com.au

RITA BONETTI

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)

Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au
Email RBonetti@golder.com.au

CERTIFICATE OF ANALYSIS

Work Order : **ES1826966**
Client : **GOLDER ASSOCIATES**
Contact : MS RITA BONETTI
Address : LEVEL 1, 124 PACIFIC HIGHWAY
 ST LEONARDS NSW, AUSTRALIA 2065
Telephone : +61 02 9478 3900
Project : 18105360
Order number :
C-O-C number : ----
Sampler : SL
Site : St Leonards Top Spring
Quote number : EN/002/18 National BQ
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 4
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 11-Sep-2018 12:00
Date Analysis Commenced : 13-Sep-2018
Issue Date : 17-Sep-2018 13:37



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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

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

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



Analytical Results

Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID

				BH08_0.0	----	----	----	----
Client sampling date / time				30-Aug-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1826966-001	-----	-----	-----	-----
Result					----	----	----	----
EN33: TCLP Leach								
Initial pH	----	0.1	pH Unit	6.3	----	----	----	----
After HCl pH	----	0.1	pH Unit	1.6	----	----	----	----
Extraction Fluid Number	----	1	-	1	----	----	----	----
Final pH	----	0.1	pH Unit	5.0	----	----	----	----



Analytical Results

Sub-Matrix: **TCLP LEACHATE**
 (Matrix: **WATER**)

Client sample ID

				BH08_0.0	----	----	----	----
Client sampling date / time				30-Aug-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1826966-001	-----	-----	-----	-----
				Result	----	----	----	----
EG005C: Leachable Metals by ICPAES								
Lead	7439-92-1	0.1	mg/L	0.1	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: ES1826966	Page	: 1 of 3
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Contact	: Customer Services ES
Address	: LEVEL 1, 124 PACIFIC HIGHWAY ST LEONARDS NSW, AUSTRALIA 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9478 3900	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 11-Sep-2018
Order number	:	Date Analysis Commenced	: 13-Sep-2018
C-O-C number	: ----	Issue Date	: 17-Sep-2018
Sampler	: SL		
Site	: St Leonards Top Spring		
Quote number	: EN/002/18 National BQ		
No. of samples received	: 1		
No. of samples analysed	: 1		



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

This 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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



General Comments

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

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

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

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

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: **WATER**

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: 1931919)									
ES1826887-001	Anonymous	EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	<0.1	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 Spike (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 Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EN33: TCLP Leach (QCLot: 1929021)								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) LowHigh	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005C: Leachable Metals by ICPAES (QCLot: 1931919)								
EG005C: Lead	7439-92-1	0.1	mg/L	<0.1	0.1 mg/L	102	80	118

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: WATER				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number			Low	High
EG005C: Leachable Metals by ICPAES (QCLot: 1931919)							
ES1826889-001	Anonymous	EG005C: Lead	7439-92-1	1 mg/L	106	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1826966	Page	: 1 of 4
Client	: GOLDER ASSOCIATES	Laboratory	: Environmental Division Sydney
Contact	: MS RITA BONETTI	Telephone	: +61-2-8784 8555
Project	: 18105360	Date Samples Received	: 11-Sep-2018
Site	: St Leonards Top Spring	Issue Date	: 17-Sep-2018
Sampler	: SL	No. of samples received	: 1
Order number	:	No. of samples analysed	: 1

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

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

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	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN33: TCLP Leach							
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) BH08_0.0	30-Aug-2018	13-Sep-2018	26-Feb-2019	✔	----	----	----

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG005C: Leachable Metals by ICPAES							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG005C) BH08_0.0	13-Sep-2018	14-Sep-2018	12-Mar-2019	✔	14-Sep-2018	12-Mar-2019	✔



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	Method	Count		Rate (%)			Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected	Evaluation	
Method Blanks (MB)							
TCLP for Non & Semivolatile Analytes	EN33a	1	3	33.33	9.09	✔	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Leachable Metals by ICPAES	EG005C	1	4	25.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Leachable Metals by ICPAES	EG005C	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Leachable Metals by ICPAES	EG005C	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Leachable Metals by ICPAES	EG005C	1	4	25.00	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
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)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals in TCLP Leachate	EN25C	SOIL	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
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.

SAMPLE CHAIN OF CUSTODY DOCUMENTATION

Sheet 1 of 2

Project No: 18105360		Lab Name: ALS		GOLDER ASSOCIATES PTY LTD		Phone: (02) 9478 3900																																																																																																																																																																																																																																	
Site Location: St Leonards Top Spring		Quote No. EN/002/17		124 Pacific Highway, Greenwich		Fax: (02) 9478 3901																																																																																																																																																																																																																																	
Sampled By: RB / SL		Order No.:		Project Manager: Rita Bonetti		Reviewed: SPD																																																																																																																																																																																																																																	
Turnaround Time: 24hrs ☐ 48hrs ☐ Standard ☒		Date Required By:		Job Contact: Rita Bonetti		Phone: 0437039929		Email: rbonetti@golder.com.au																																																																																																																																																																																																																															
Delivery Option: HARD ☐ FAX ☐ DISK ☐ EMAIL ☒ BULLETIN BOARD ☐		ANALYSIS REQUIRED																																																																																																																																																																																																																																					
Report Format: PDF ☒ EXCEL ☒ ESDAT ☒																																																																																																																																																																																																																																							
Comments/Special Instructions:								SGS EHS Alexandria Laboratory SE183109 COC Received: 27 - Aug - 2018																																																																																																																																																																																																																															
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>LAB ID</th> <th>SAMPLE ID</th> <th>SAMPLE TIME</th> <th>SAMPLE DATE</th> <th>SAMPLE TYPE</th> <th>SAMPLE MATRIX</th> <th>No CONTAINERS</th> <th>Level of Contamination (Low/High/Unknown)</th> <th>HOLD</th> <th>S16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs</th> <th>S26 - 8 metals, TRH, BTEXN & PAHs</th> <th>EA200 - Asbestos Presence/Absence</th> <th>W5 - TRH (G-C40) / BTEXN / 8 total metals</th> <th>Send to SGS</th> </tr> </thead> <tbody> <tr><td>1</td><td>BH02_0.05</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>BH02_0.5</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td></td><td>X</td><td></td><td>X</td><td></td><td></td></tr> <tr><td>3</td><td>BH02_0.8</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>BH04_0.1</td><td></td><td>21/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr> <tr><td>5</td><td>BH06_0.08</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td></td><td>X</td><td></td><td>X</td><td></td><td></td></tr> <tr><td>6</td><td>BH06_0.22</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td>BH06_0.5</td><td></td><td>22/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr> <tr><td>8</td><td>BH07_0.15</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td></td><td>X</td><td></td><td>X</td><td></td><td></td></tr> <tr><td>9</td><td>BH07_0.5</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td>BH07_0.6</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td>BH07_0.9</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>2</td><td>U</td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr> <tr><td>12</td><td>QCA100</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>13</td><td>QCA101</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td></td><td>X</td><td></td><td></td><td></td><td></td></tr> <tr><td>1</td><td>QCB100</td><td></td><td>20/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td>X</td><td></td><td></td><td></td><td>X</td><td></td></tr> <tr><td>2</td><td>QCB101</td><td></td><td>23/08/2018</td><td>DS</td><td>Soil</td><td>1</td><td>U</td><td></td><td>X</td><td></td><td></td><td>X</td><td></td></tr> </tbody> </table>										LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	No CONTAINERS	Level of Contamination (Low/High/Unknown)	HOLD	S16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs	S26 - 8 metals, TRH, BTEXN & PAHs	EA200 - Asbestos Presence/Absence	W5 - TRH (G-C40) / BTEXN / 8 total metals	Send to SGS	1	BH02_0.05		20/08/2018	DS	Soil	2	U	X						2	BH02_0.5		20/08/2018	DS	Soil	2	U		X		X			3	BH02_0.8		20/08/2018	DS	Soil	1	U			X				4	BH04_0.1		21/08/2018	DS	Soil	1	U			X				5	BH06_0.08		22/08/2018	DS	Soil	2	U		X		X			6	BH06_0.22		22/08/2018	DS	Soil	2	U	X						7	BH06_0.5		22/08/2018	DS	Soil	2	U			X				8	BH07_0.15		23/08/2018	DS	Soil	2	U		X		X			9	BH07_0.5		23/08/2018	DS	Soil	1	U	X						10	BH07_0.6		23/08/2018	DS	Soil	1	U	X						11	BH07_0.9		23/08/2018	DS	Soil	2	U			X				12	QCA100		20/08/2018	DS	Soil	1	U	X						13	QCA101		23/08/2018	DS	Soil	1	U		X					1	QCB100		20/08/2018	DS	Soil	1	U	X				X		2	QCB101		23/08/2018	DS	Soil	1	U		X		
LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	No CONTAINERS	Level of Contamination (Low/High/Unknown)	HOLD	S16 - 8 metals, TRH, BTEXN, PAHs, OCPs & PCBs	S26 - 8 metals, TRH, BTEXN & PAHs	EA200 - Asbestos Presence/Absence	W5 - TRH (G-C40) / BTEXN / 8 total metals	Send to SGS																																																																																																																																																																																																																										
1	BH02_0.05		20/08/2018	DS	Soil	2	U	X																																																																																																																																																																																																																															
2	BH02_0.5		20/08/2018	DS	Soil	2	U		X		X																																																																																																																																																																																																																												
3	BH02_0.8		20/08/2018	DS	Soil	1	U			X																																																																																																																																																																																																																													
4	BH04_0.1		21/08/2018	DS	Soil	1	U			X																																																																																																																																																																																																																													
5	BH06_0.08		22/08/2018	DS	Soil	2	U		X		X																																																																																																																																																																																																																												
6	BH06_0.22		22/08/2018	DS	Soil	2	U	X																																																																																																																																																																																																																															
7	BH06_0.5		22/08/2018	DS	Soil	2	U			X																																																																																																																																																																																																																													
8	BH07_0.15		23/08/2018	DS	Soil	2	U		X		X																																																																																																																																																																																																																												
9	BH07_0.5		23/08/2018	DS	Soil	1	U	X																																																																																																																																																																																																																															
10	BH07_0.6		23/08/2018	DS	Soil	1	U	X																																																																																																																																																																																																																															
11	BH07_0.9		23/08/2018	DS	Soil	2	U			X																																																																																																																																																																																																																													
12	QCA100		20/08/2018	DS	Soil	1	U	X																																																																																																																																																																																																																															
13	QCA101		23/08/2018	DS	Soil	1	U		X																																																																																																																																																																																																																														
1	QCB100		20/08/2018	DS	Soil	1	U	X				X																																																																																																																																																																																																																											
2	QCB101		23/08/2018	DS	Soil	1	U		X			X																																																																																																																																																																																																																											
SAMPLE MATRIX = Soil/Sediment/Fill/Water/Other SAMPLE TYPE = Composite(C)/Discrete(DC)/Disturbed(DS)/Core(CR), Grab Sample (GS) HIGH CONCENTRATION: circle expected parameters in analysis																																																																																																																																																																																																																																							
SIGNATURE		COMPANY		DATE		TIME		SIGNATURE		COMPANY																																																																																																																																																																																																																													
RELEASED BY: <i>[Signature]</i>		Golder Associates		24/8/18		11:00am		RELEASED BY:																																																																																																																																																																																																																															
RECEIVED BY: <i>[Signature]</i>		ALU.		24/8/18		1500		RECEIVED BY:																																																																																																																																																																																																																															
RELEASED BY: <i>[Signature]</i>		SGS		27/08/18		3.15		To Be Filled Out By Analysing Laboratory Security Seal: <i>[Signature]</i> Suitable Containers: 3-2C Cool Box: <i>[Signature]</i>		LAB. BATC Chilled Frozen Ambient																																																																																																																																																																																																																													
RECEIVED BY:																																																																																																																																																																																																																																							
RELEASED BY:																																																																																																																																																																																																																																							
RECEIVED BY:																																																																																																																																																																																																																																							

Environmental Division
Sydney
Work Order Reference
ES1825146



Telephone : + 61-2-8784 8555



SAMPLE RECEIPT ADVICE

SE183109

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au

Project **18105360 St Leonards Top Spring**
Order Number (Not specified)
Samples 2

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

Samples Received Mon 27/8/2018
Report Due Mon 3/9/2018
SGS Reference **SE183109**

SUBMISSION DETAILS

This is to confirm that 2 samples were received on Monday 27/8/2018. Results are expected to be ready by COB Monday 3/9/2018. Please quote SGS reference SE183109 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provided	Other Lab	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	2 Soil
Date documentation received	27/8/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

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

COMMENTS

1 sample on hold.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



SAMPLE RECEIPT ADVICE

SE183109

CLIENT DETAILS

Client **GOLDER ASSOCIATES PTY LTD**

Project **18105360 St Leonards Top Spring**

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	Total Recoverable Elements in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
002	QCB101	29	14	26	11	7	10	12	8

CONTINUED OVERLEAF

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



SAMPLE RECEIPT ADVICE

SE183109

CLIENT DETAILS

Client **GOLDER ASSOCIATES PTY LTD**

Project **18105360 St Leonards Top Spring**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content
002	QCB101	1	1

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

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au

Project 18105360 St Leonards Top Spring
Order Number (Not specified)
Samples 2

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference SE183109 R0
Date Received 27/8/2018
Date Reported 3/9/2018

COMMENTS

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

SIGNATORIES



Bennet Lo
Senior Organic Chemist/Metals Chemist



Kamrul Ahsan
Senior Chemist



Ly Kim Ha
Organic Section Head



Shane McDermott
Inorganic/Metals Chemist



Teresa Nguyen
Organic Chemist

VOC's in Soil [AN433] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	51
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16	mg/kg	25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

OC Pesticides in Soil [AN420] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1
Lindane	mg/kg	0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1
Aldrin	mg/kg	0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2
Endrin	mg/kg	0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1
Isodrin	mg/kg	0.1	<0.1
Mirex	mg/kg	0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1

OP Pesticides in Soil [AN420] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Dichlorvos	mg/kg	0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2
Malathion	mg/kg	0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2
Methidathion	mg/kg	0.5	<0.5
Ethion	mg/kg	0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7

PCBs in Soil [AN420] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Arochlor 1016	mg/kg	0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
Arsenic, As	mg/kg	1	1
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	5.1
Copper, Cu	mg/kg	0.5	3.1
Lead, Pb	mg/kg	1	11
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	2	9.0



ANALYTICAL RESULTS

SE183109 R0

Mercury in Soil [AN312] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
PARAMETER	UOM	LOR	SE183109.002
Mercury	mg/kg	0.05	<0.05



ANALYTICAL RESULTS

SE183109 R0

Moisture Content [AN002] Tested: 29/8/2018

			QCB101
			SOIL
			-
			23/8/2018
			SE183109.002
PARAMETER	UOM	LOR	
% Moisture	%w/w	0.5	5.9

METHOD

METHODOLOGY SUMMARY

AN002

The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.

AN040/AN320

A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.

AN040

A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.

AN312

Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500

AN403

Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.

AN403

Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.

AN403

The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

AN420

(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

AN420

SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

AN433

VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

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

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

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

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

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

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

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

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

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This report must not be reproduced, except in full.



STATEMENT OF QA/QC PERFORMANCE

SE183109 R0

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au

Project **18105360 St Leonards Top Spring**
Order Number (Not specified)
Samples 2

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference **SE183109 R0**
Date Received 27 Aug 2018
Date Reported 03 Sep 2018

COMMENTS

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

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

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

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item
-----------	---	--------

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Other Lab	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	2 Soil
Date documentation received	27/8/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	6.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

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

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

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

Mercury in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155379	23 Aug 2018	27 Aug 2018	20 Sep 2018	29 Aug 2018	20 Sep 2018	31 Aug 2018

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155353	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	03 Sep 2018	31 Aug 2018

OC Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155370	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

OP Pesticides in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155370	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155370	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

PCBs in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155370	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155376	23 Aug 2018	27 Aug 2018	19 Feb 2019	29 Aug 2018	19 Feb 2019	31 Aug 2018

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155370	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155366	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB101	SE183109.002	LB155366	23 Aug 2018	27 Aug 2018	06 Sep 2018	29 Aug 2018	08 Oct 2018	03 Sep 2018

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

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

OC Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	QCB101	SE183109.002	%	60 - 130%	90

OP Pesticides in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	QCB101	SE183109.002	%	60 - 130%	100
d14-p-terphenyl (Surrogate)	QCB101	SE183109.002	%	60 - 130%	102

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	QCB101	SE183109.002	%	70 - 130%	100
d14-p-terphenyl (Surrogate)	QCB101	SE183109.002	%	70 - 130%	102
d5-nitrobenzene (Surrogate)	QCB101	SE183109.002	%	70 - 130%	92

PCBs in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	QCB101	SE183109.002	%	60 - 130%	90

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QCB101	SE183109.002	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	QCB101	SE183109.002	%	60 - 130%	86
d8-toluene (Surrogate)	QCB101	SE183109.002	%	60 - 130%	118
Dibromofluoromethane (Surrogate)	QCB101	SE183109.002	%	60 - 130%	77

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QCB101	SE183109.002	%	60 - 130%	72
d4-1,2-dichloroethane (Surrogate)	QCB101	SE183109.002	%	60 - 130%	86
d8-toluene (Surrogate)	QCB101	SE183109.002	%	60 - 130%	118
Dibromofluoromethane (Surrogate)	QCB101	SE183109.002	%	60 - 130%	77

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

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

Mercury in Soil

Method: ME-(AU)-ENVJAN312

Sample Number	Parameter	Units	LOR	Result
LB155379.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-ENVJAN420

Sample Number	Parameter	Units	LOR	Result
LB155370.001	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
	Alpha BHC	mg/kg	0.1	<0.1
	Lindane	mg/kg	0.1	<0.1
	Heptachlor	mg/kg	0.1	<0.1
	Aldrin	mg/kg	0.1	<0.1
	Beta BHC	mg/kg	0.1	<0.1
	Delta BHC	mg/kg	0.1	<0.1
	Heptachlor epoxide	mg/kg	0.1	<0.1
	Alpha Endosulfan	mg/kg	0.2	<0.2
	Gamma Chlordane	mg/kg	0.1	<0.1
	Alpha Chlordane	mg/kg	0.1	<0.1
	p,p'-DDE	mg/kg	0.1	<0.1
	Dieldrin	mg/kg	0.2	<0.2
	Endrin	mg/kg	0.2	<0.2
	Beta Endosulfan	mg/kg	0.2	<0.2
	p,p'-DDD	mg/kg	0.1	<0.1
	p,p'-DDT	mg/kg	0.1	<0.1
	Endosulfan sulphate	mg/kg	0.1	<0.1
	Endrin Aldehyde	mg/kg	0.1	<0.1
	Methoxychlor	mg/kg	0.1	<0.1
	Endrin Ketone	mg/kg	0.1	<0.1
Surrogates	Isodrin	mg/kg	0.1	<0.1
	Mirex	mg/kg	0.1	<0.1
	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	70

OP Pesticides in Soil

Method: ME-(AU)-ENVJAN420

Sample Number	Parameter	Units	LOR	Result
LB155370.001	Dichlorvos	mg/kg	0.5	<0.5
	Dimethoate	mg/kg	0.5	<0.5
	Diazinon (Dimpylate)	mg/kg	0.5	<0.5
	Fenitrothion	mg/kg	0.2	<0.2
	Malathion	mg/kg	0.2	<0.2
	Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
	Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
	Bromophos Ethyl	mg/kg	0.2	<0.2
	Methidathion	mg/kg	0.5	<0.5
	Ethion	mg/kg	0.2	<0.2
	Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
Surrogates	2-fluorobiphenyl (Surrogate)	%	-	96
	d14-p-terphenyl (Surrogate)	%	-	94

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-ENVJAN420

Sample Number	Parameter	Units	LOR	Result
LB155370.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1
	Fluoranthene	mg/kg	0.1	<0.1
	Pyrene	mg/kg	0.1	<0.1
	Benzo(a)anthracene	mg/kg	0.1	<0.1
	Chrysene	mg/kg	0.1	<0.1
	Benzo(a)pyrene	mg/kg	0.1	<0.1

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

Sample Number	Parameter	Units	LOR	Result
LB155370.001	Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
	Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
	Benzo(ghi)perylene	mg/kg	0.1	<0.1
	Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates			
	d5-nitrobenzene (Surrogate)	%	-	92
	2-fluorobiphenyl (Surrogate)	%	-	96
	d14-p-terphenyl (Surrogate)	%	-	94

PCBs in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB155370.001	Arochlor 1016	mg/kg	0.2	<0.2
	Arochlor 1221	mg/kg	0.2	<0.2
	Arochlor 1232	mg/kg	0.2	<0.2
	Arochlor 1242	mg/kg	0.2	<0.2
	Arochlor 1248	mg/kg	0.2	<0.2
	Arochlor 1254	mg/kg	0.2	<0.2
	Arochlor 1260	mg/kg	0.2	<0.2
	Arochlor 1262	mg/kg	0.2	<0.2
	Arochlor 1268	mg/kg	0.2	<0.2
	Total PCBs (Arochlors)	mg/kg	1	<1
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	70

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

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

Sample Number	Parameter	Units	LOR	Result
LB155376.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB155370.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB155366.001	Monocyclic Aromatic Hydrocarbons	Benzene	mg/kg	0.1	<0.1
		Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	77
		d4-1,2-dichloroethane (Surrogate)	%	-	84
		d8-toluene (Surrogate)	%	-	105
		Bromofluorobenzene (Surrogate)	%	-	71
Totals	Total BTEX	mg/kg	0.6	<0.6	

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB155366.001	TRH C6-C9	mg/kg	20	<20
	Surrogates			
	Dibromofluoromethane (Surrogate)	%	-	77
	d4-1,2-dichloroethane (Surrogate)	%	-	84
	d8-toluene (Surrogate)	%	-	105

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

Mercury in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183109.002	LB155379.023	Mercury	mg/kg	0.05	<0.05	<0.05	200	0
SE183180.003	LB155379.014	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183109.002	LB155353.020	% Moisture	%w/w	0.5	5.9	6.9	46	15

OC Pesticides in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.001	LB155370.028	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Lindane	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
		Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
		Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
		Endrin	mg/kg	0.2	<0.2	<0.2	200	0
		o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
		p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
		Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
		Mirex	mg/kg	0.1	<0.1	<0.1	200	0
SE183180.010	LB155370.027	Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Surrogates						
SE183180.010	LB155370.027	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.18	0.19	30	3
		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Lindane	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
		Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
		Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
		trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
		Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
		Endrin	mg/kg	0.2	<0.2	<0.2	200	0
		o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
		o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

OC Pesticides in Soil (continued)

Method: ME-(AU)-ENVJAN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.010	LB155370.027	p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
		Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
		Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
		Mirex	mg/kg	0.1	<0.1	<0.1	200	0
		Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.18	0.18	30	1

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-ENVJAN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE183180.002	LB155370.025	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0	
		Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Fluorene	mg/kg	0.1	<0.1	<0.1	200	0	
		Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Chrysene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(b&i)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0	
		Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	<0.2	200	0	
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	<0.3	134	0	
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0	
		Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0	
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	30	3
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	30	5
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.4	30	4
SE183180.010	LB155370.026	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0	
		Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0	
		Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Fluorene	mg/kg	0.1	<0.1	<0.1	200	0	
		Phenanthrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Chrysene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(b&i)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(a)pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	200	0	
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0	
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	200	0	
		Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	<0.2	200	0	
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	<0.3	134	0	
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	<0.2	<0.2	175	0	
		Total PAH (18)	mg/kg	0.8	<0.8	<0.8	200	0	
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	30	2
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.010	LB155370.026	Surrogates d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	2

PCBs in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.001	LB155370.025	Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
		Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
SE183180.010	LB155370.024	Surrogates Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	3
		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
		Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
SE183180.003	LB155376.014	Surrogates Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	1
		Arsenic, As	mg/kg	1	1	1	113	6
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	5.1	6.4	39	23
		Copper, Cu	mg/kg	0.5	3.1	2.9	47	5
		Nickel, Ni	mg/kg	0.5	<0.5	<0.5	156	0
		Lead, Pb	mg/kg	1	11	13	38	15
		Zinc, Zn	mg/kg	2	9.0	9.9	51	9
		Arsenic, As	mg/kg	1	4	2	65	68 @
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
SE183180.003	LB155376.014	Chromium, Cr	mg/kg	0.3	4.9	5.5	40	11
		Copper, Cu	mg/kg	0.5	20	22	32	10
		Nickel, Ni	mg/kg	0.5	1.2	1.6	66	26
		Lead, Pb	mg/kg	1	16	19	36	16
		Zinc, Zn	mg/kg	2	13	16	44	25

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

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183109.002	LB155376.023	Arsenic, As	mg/kg	1	1	1	113	6
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	5.1	6.4	39	23
		Copper, Cu	mg/kg	0.5	3.1	2.9	47	5
		Nickel, Ni	mg/kg	0.5	<0.5	<0.5	156	0
		Lead, Pb	mg/kg	1	11	13	38	15
		Zinc, Zn	mg/kg	2	9.0	9.9	51	9
		Arsenic, As	mg/kg	1	4	2	65	68 @
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	4.9	5.5	40	11
SE183180.003	LB155376.014	Copper, Cu	mg/kg	0.5	20	22	32	10
		Nickel, Ni	mg/kg	0.5	1.2	1.6	66	26
		Lead, Pb	mg/kg	1	16	19	36	16
		Zinc, Zn	mg/kg	2	13	16	44	25

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.002	LB155370.025	TRH C10-C14	mg/kg	20	<20	<20	200	0
		TRH C15-C28	mg/kg	45	<45	<45	200	0
		TRH C29-C36	mg/kg	45	<45	<45	200	0
		TRH C37-C40	mg/kg	100	<100	<100	200	0
		TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
		TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0
		TRH >C10-C16	mg/kg	25	<25	<25	200	0
		TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
		TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
		TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0
SE183180.010	LB155370.026	TRH C10-C14	mg/kg	20	<20	<20	200	0
		TRH C15-C28	mg/kg	45	<45	<45	200	0
		TRH C29-C36	mg/kg	45	<45	<45	200	0
		TRH C37-C40	mg/kg	100	<100	<100	200	0
		TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
		TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-ENVJAN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183180.010	LB155370.026	TRH F Bands	TRH >C10-C16	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-ENVJAN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183109.002	LB155366.023	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	3.7	50	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	3.9	50	10
			d8-toluene (Surrogate)	mg/kg	-	5.9	6.1	50	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.6	3.6	50	1
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0
SE183180.003	LB155366.014	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
			Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	4.2	50	19
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.7	3.9	50	5
			d8-toluene (Surrogate)	mg/kg	-	4.4	4.4	50	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	50	5
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-ENVJAN433

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE183109.002	LB155366.023	TRH C6-C10	mg/kg	25	<25	<25	200	0	
		TRH C6-C9	mg/kg	20	<20	<20	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	3.7	30	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	3.9	30	10
			d8-toluene (Surrogate)	mg/kg	-	5.9	6.1	30	3
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.6	3.6	30	1
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE183180.003	LB155366.014	TRH C6-C10	mg/kg	25	<25	<25	200	0	
		TRH C6-C9	mg/kg	20	<20	<20	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.5	4.2	30	19
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.7	3.9	30	5
			d8-toluene (Surrogate)	mg/kg	-	4.4	4.4	30	1
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.7	3.5	30	5
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

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

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

Mercury in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155379.002	Mercury	mg/kg	0.05	0.22	0.2	70 - 130	108

OC Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155370.002	Heptachlor	mg/kg	0.1	0.3	0.2	60 - 140	125
	Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	123
	Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	116
	Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	122
	Endrin	mg/kg	0.2	0.2	0.2	60 - 140	113
	p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	87
Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.18	0.15	40 - 130	122

OP Pesticides in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155370.002	Dichlorvos	mg/kg	0.5	1.9	2	60 - 140	95
	Diazinon (Dimpylate)	mg/kg	0.5	1.9	2	60 - 140	94
	Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	2.1	2	60 - 140	104
	Ethion	mg/kg	0.2	1.8	2	60 - 140	90
Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	82
	d14-p-terphenyl (Surrogate)	mg/ka	-	0.4	0.5	40 - 130	84

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB155370.002	Naphthalene	mg/kg	0.1	4.3	4	60 - 140	108	
	Acenaphthylene	mg/kg	0.1	4.3	4	60 - 140	109	
	Acenaphthene	mg/kg	0.1	4.2	4	60 - 140	105	
	Phenanthrene	mg/kg	0.1	4.3	4	60 - 140	108	
	Anthracene	mg/kg	0.1	4.1	4	60 - 140	103	
	Fluoranthene	mg/kg	0.1	4.2	4	60 - 140	106	
	Pyrene	mg/kg	0.1	4.3	4	60 - 140	106	
	Benzo(a)pyrene	mg/kg	0.1	4.4	4	60 - 140	109	
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	78
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	82
d14-p-terphenyl (Surrogate)		mg/kg	-	0.4	0.5	40 - 130	84	

PCBs in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155370.002	Arochlor 1260	mg/kg	0.2	0.4	0.4	60 - 140	99

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155376.002	Arsenic, As	mg/kg	1	390	336.32	79 - 120	117
	Cadmium, Cd	mg/kg	0.3	450	416.6	69 - 131	107
	Chromium, Cr	mg/kg	0.3	37	35.2	80 - 120	105
	Copper, Cu	mg/kg	0.5	340	370.46	80 - 120	92
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	97
	Lead, Pb	mg/kg	1	100	107.87	79 - 120	95
	Zinc, Zn	mg/kg	2	330	301.27	80 - 121	108

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB155370.002	TRH C10-C14	mg/kg	20	43	40	60 - 140	108	
	TRH C15-C28	mg/kg	45	50	40	60 - 140	125	
	TRH C29-C36	mg/kg	45	<45	40	60 - 140	80	
	TRH F Bands	TRH >C10-C16	mg/kg	25	42	40	60 - 140	105
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	110
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	90

VOC's in Soil

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

Sample Number	Parameter	Units	LOR
---------------	-----------	-------	-----

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

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

VOC's in Soil (continued)

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB155366.002	Monocyclic	Benzene	mg/kg	0.1	2.1	2.9	60 - 140
	Aromatic	Toluene	mg/kg	0.1	2.0	2.9	60 - 140
		Ethylbenzene	mg/kg	0.1	2.2	2.9	60 - 140
		m/p-xylene	mg/kg	0.2	4.3	5.8	60 - 140
		o-xylene	mg/kg	0.1	2.0	2.9	60 - 140
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	5	60 - 140
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	5	60 - 140
		d8-toluene (Surrogate)	mg/kg	-	4.4	5	60 - 140
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %	
LB155366.002	TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	91	
	TRH C6-C9	mg/kg	20	21	23.2	60 - 140	89	
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.6	5	60 - 140	73
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	5	60 - 140	91
		d8-toluene (Surrogate)	mg/kg	-	4.4	5	60 - 140	87
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	5	60 - 140	97
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/ka	25	<25	7.25	60 - 140	137

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

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

Mercury in Soil

Method: ME-(AU)-[ENV]JAN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.001	LB155379.004	Mercury	mg/kg	0.05	0.19	<0.05	0.2	95

OC Pesticides in Soil

Method: ME-(AU)-[ENV]JAN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.003	LB155370.029	Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Lindane	mg/kg	0.1	<0.1	<0.1	-	-
		Heptachlor	mg/kg	0.1	0.2	<0.1	0.2	109
		Aldrin	mg/kg	0.1	0.2	<0.1	0.2	96
		Beta BHC	mg/kg	0.1	<0.1	<0.1	-	-
		Delta BHC	mg/kg	0.1	0.2	<0.1	0.2	107
		Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
		Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	-	-
		trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDE	mg/kg	0.1	<0.1	<0.1	-	-
		Dieldrin	mg/kg	0.2	0.2	<0.2	0.2	123
		Endrin	mg/kg	0.2	0.2	<0.2	0.2	119
		o,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
		o,p'-DDT	mg/kg	0.1	<0.1	<0.1	-	-
		Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	-	-
		p,p'-DDD	mg/kg	0.1	<0.1	<0.1	-	-
		p,p'-DDT	mg/kg	0.1	0.2	<0.1	0.2	97
		Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	-	-
		Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	-	-
		Methoxychlor	mg/kg	0.1	<0.1	<0.1	-	-
		Endrin Ketone	mg/kg	0.1	<0.1	<0.1	-	-
		Isodrin	mg/kg	0.1	<0.1	<0.1	-	-
		Mirex	mg/kg	0.1	<0.1	<0.1	-	-
		Total CLP OC Pesticides	mg/kg	1	1	<1	-	-
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.12	0.11	-	81

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]JAN420

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.002	LB155370.024	Naphthalene	mg/kg	0.1	4.4	<0.1	4	109
		2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Acenaphthylene	mg/kg	0.1	4.3	<0.1	4	109
		Acenaphthene	mg/kg	0.1	4.2	<0.1	4	105
		Fluorene	mg/kg	0.1	<0.1	<0.1	-	-
		Phenanthrene	mg/kg	0.1	4.6	<0.1	4	114
		Anthracene	mg/kg	0.1	4.3	<0.1	4	109
		Fluoranthene	mg/kg	0.1	4.2	<0.1	4	105
		Pyrene	mg/kg	0.1	4.5	<0.1	4	112
		Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
		Chrysene	mg/kg	0.1	<0.1	<0.1	-	-
		Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
		Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	-	-
		Benzo(a)pyrene	mg/kg	0.1	4.1	<0.1	4	101
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1	-	-
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	-	-
		Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	4.1	<0.2	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	4.2	<0.3	-	-
		Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	4.1	<0.2	-	-
		Total PAH (18)	mg/kg	0.8	34	<0.8	-	-
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.4	-	76

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE183229.002	LB155370.024	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.4	-	86
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.4	-	90

PCBs in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.003	LB155370.026	Arochlor 1016	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1221	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1232	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1242	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1248	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1254	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1260	mg/kg	0.2	0.4	<0.2	0.4	106
		Arochlor 1262	mg/kg	0.2	<0.2	<0.2	-	-
		Arochlor 1268	mg/kg	0.2	<0.2	<0.2	-	-
		Total PCBs (Arochlors)	mg/kg	1	<1	<1	-	-
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	-	87

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

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.001	LB155376.004	Arsenic, As	mg/kg	1	55	5	50	100
		Cadmium, Cd	mg/kg	0.3	49	<0.3	50	99
		Chromium, Cr	mg/kg	0.3	71	19	50	103
		Copper, Cu	mg/kg	0.5	54	3.5	50	102
		Nickel, Ni	mg/kg	0.5	48	<0.5	50	95
		Lead, Pb	mg/kg	1	60	12	50	96
		Zinc, Zn	mg/kg	2	57	5.6	50	103

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.002	LB155370.024	TRH C10-C14	mg/kg	20	55	<20	40	138
		TRH C15-C28	mg/kg	45	73	<45	40	130
		TRH C29-C36	mg/kg	45	<45	<45	40	95
		TRH C37-C40	mg/kg	100	<100	<100	-	-
		TRH C10-C36 Total	mg/kg	110	130	<110	-	-
		TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210	-	-
	TRH F Bands	TRH >C10-C16	mg/kg	25	53	<25	40	133
		TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	53	<25	-	-
		TRH >C16-C34 (F3)	mg/kg	90	<90	<90	40	100
		TRH >C34-C40 (F4)	mg/kg	120	<120	<120	-	-

VOC's in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.001	LB155366.004	Monocyclic	Benzene	mg/kg	0.1	1.9	<0.1	2.9	65
			Aromatic	Toluene	mg/kg	0.1	2.0	<0.1	2.9
			Ethylbenzene	mg/kg	0.1	2.0	<0.1	2.9	68
			m/p-xylene	mg/kg	0.2	3.9	<0.2	5.8	67
			o-xylene	mg/kg	0.1	1.8	<0.1	2.9	62
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	4.0	-	87
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	5.2	-	80
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.0	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.5	-	84
		Totals	Total Xylenes	mg/kg	0.3	5.7	<0.3	-	-
			Total BTEX	mg/kg	0.6	12	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample			Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.001	LB155366.004		TRH C6-C10	mg/kg	25	<25	<25	<25	24.65	85
			TRH C6-C9	mg/kg	20	<20	<20	<20	23.2	73
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.3	4.0	-	-	87
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	5.2	-	-	80
			d8-toluene (Surrogate)	mg/kg	-	4.2	5.0	-	-	85
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.2	3.5	-	-	84

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

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

Volatile Petroleum Hydrocarbons in Soil (continued)

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183229.001	LB155366.004	VPH F	Benzene (F0)	mg/kg	0.1	1.9	<0.1	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25
								130

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - Sample not analysed for this analyte.
 - IS Insufficient sample for analysis.
 - LNR Sample listed, but not received.
 - LOR Limit of reporting.
 - QFH QC result is above the upper tolerance.
 - QFL QC result is below the lower tolerance.
-
- ① At least 2 of 3 surrogates are within acceptance criteria.
 - ② RPD failed acceptance criteria due to sample heterogeneity.
 - ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
 - ④ Recovery failed acceptance criteria due to matrix interference.
 - ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
 - ⑥ LOR was raised due to sample matrix interference.
 - ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
 - ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
 - ⑨ Recovery failed acceptance criteria due to sample heterogeneity.
 - ⑩ LOR was raised due to high conductivity of the sample (required dilution).
 - † Refer to Analytical Report comments for further information.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This test report shall not be reproduced, except in full.

SAMPLE CHAIN OF CUSTODY DOCUMENTATION

Sheet 1 of 1

Project No: 18105360		Lab Name: ALS		GOLDER ASSOCIATES PTY LTD		Phone: (02) 9478 3900												
Site Location: St Leonards Top Spring		Quote No: EN/002/17		124 Pacific Highway, Greenwich		Fax: (02) 9478 3901												
Sampled By: RB		Order No:		Project Manager: Rita Bonetti		Reviewed: SPD												
Turnaround Time: 24hrs ☐ 48hrs ☐ Standard ☒		36hrs ☐ 5 Days ☐ Date Required By:		Job Contact: Rita Bonetti		Phone: 0437039929		Email: rbonetti@golder.com.au										
Delivery Option: HARD ☐ FAX ☐ DISK ☐ EMAIL ☒ BULLETIN BOARD ☐		ANALYSIS REQUIRED																
Report Format: PDF ☒ EXCEL ☒ ESDAT ☒																		
Comments/Special Instructions: *TAT for pH + EC*						Subcon / Forward Lab / Split WO Lab / Analysis: <u>SGS / QCB200</u> Organised By / Date: _____ Relinquished By / Date: _____ Connote / Courier: _____ WO No: _____ Attached By PO / Internal Sheet: _____												
LAB ID	SAMPLE ID	SAMPLE TIME	SAMPLE DATE	SAMPLE TYPE	SAMPLE MATRIX	No CONTAINERS	Level of Contamination (Low/High/Unknown)	HOLD	W10 - TRH / BTEXN / PAHs / VOCs	W2 - 8 metals (dissolved)	Extra volume for lab QAQC	EA010 - Conductivity	EA005 - pH	NT-2 (Major Anions - Chloride, sulfate, alkalinity)				
1	BH02_180910	13:20	10/09/2018		Water	5	U		x	x								
2	BH05_180910	14:10	10/09/2018		Water	7	U		x	x	x	x	x	x				
3	BH07_180910	15:25	10/09/2018		Water	7	U		x	x		x	x	x				
4	QCA200	-	10/09/2018		Water	5	U		x	x								
1	QCB200	-	10/09/2018		Water	5	U		x	x								
TAT																		
HAT																		
SEND TO SGS																		
Environmental Division Sydney Work Order Reference ES1826717																		
SGS EHS Alexandria Laboratory																		
 SE183733 COC Received: 11-Sep-2018																		

SAMPLE MATRIX = Soil/Sediment/Fill/Water/Other					SAMPLE TYPE = Composite(C)/Discrete(DC)/Disturbed(DS)/Core(CR), Grab Sample (GS)					HIGH CONCENTRATION: circle expected parameters in analysis list							
SIGNATURE		COMPANY		DATE		TIME		SIGNATURE		COMPANY		DATE		TIME		Method of Shipment	
RELEASED BY:		Golder Associates		10/9/18		3:30pm		RELEASED BY:								Shipping Ref:	
RECEIVED BY:		ALS - Crown Nest		10/9/18		1545		RECEIVED BY:									
RELEASED BY:								To Be Filled Out By Analysing Laboratory		LAB. BATCH NUMBER							
RECEIVED BY: ANDREW				10/9/18		7:29PM		Security Seal		☐		Chilled		☒		Bill to:	
RELEASED BY:								Suitable Containers		☐		Frozen		☐		Address	
RECEIVED BY:		SAJ		11/09/18		2:20		Cool Box		☒		Ambient		☐		4.2°C	



SAMPLE RECEIPT ADVICE

SE183733

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au

Project **18105360 - St Leonards Top Spring**
Order Number (Not specified)
Samples 1

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

Samples Received Tue 11/9/2018
Report Due Tue 18/9/2018
SGS Reference **SE183733**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Tuesday 11/9/2018. Results are expected to be ready by COB Tuesday 18/9/2018. Please quote SGS reference SE183733 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provided	Other Lab	Sample cooling method	Ice
Samples received in correct containers	Yes	Sample counts by matrix	1 Water
Date documentation received	11/9/2018	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	3.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

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

COMMENTS

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



SAMPLE RECEIPT ADVICE

SE183733

CLIENT DETAILS

Client **GOLDER ASSOCIATES PTY LTD**

Project **18105360 - St Leonards Top Spring**

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (dissolved) in Water	PAH (Polynuclear Aromatic Hydrocarbons) in Water	Trace Metals (Dissolved) in Water by ICPMS	TRH (Total Recoverable Hydrocarbons) in Water	VOCs in Water	Volatile Petroleum Hydrocarbons in Water
001	QCB200	1	22	7	10	79	8

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

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
 CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au
Project **18105360 - St Leonards Top Spring**
Order Number (Not specified)
Samples 1

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
 Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference **SE183733 R0**
Date Received 11/9/2018
Date Reported 18/9/2018

COMMENTS

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

SIGNATORIES



Akheequear Beniamdeen
Chemist



Kamrul Ahsan
Senior Chemist



Ly Kim Ha
Organic Section Head



Teresa Nguyen
Organic Chemist

VOCs in Water [AN433] Tested: 13/9/2018

			QCB200
			WATER
			-
			10/9/2018
PARAMETER	UOM	LOR	SE183733.001
Benzene	µg/L	0.5	<0.5
Toluene	µg/L	0.5	<0.5
Ethylbenzene	µg/L	0.5	<0.5
m/p-xylene	µg/L	1	<1
o-xylene	µg/L	0.5	<0.5
Total Xylenes	µg/L	1.5	<1.5
Total BTEX	µg/L	3	<3
Naphthalene	µg/L	0.5	<0.5
Dichlorodifluoromethane (CFC-12)	µg/L	5	<5
Chloromethane	µg/L	5	<5
Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3
Bromomethane	µg/L	10	<10
Chloroethane	µg/L	5	<5
Trichlorofluoromethane	µg/L	1	<1
Acetone (2-propanone)	µg/L	10	<10
Iodomethane	µg/L	5	<5
1,1-dichloroethene	µg/L	0.5	<0.5
Acrylonitrile	µg/L	0.5	<0.5
Dichloromethane (Methylene chloride)	µg/L	5	<5
Allyl chloride	µg/L	2	<2
Carbon disulfide	µg/L	2	<2
trans-1,2-dichloroethene	µg/L	0.5	<0.5
MtBE (Methyl-tert-butyl ether)	µg/L	2	<2
1,1-dichloroethane	µg/L	0.5	<0.5
Vinyl acetate	µg/L	10	<10
MEK (2-butanone)	µg/L	10	<10
cis-1,2-dichloroethene	µg/L	0.5	<0.5
Bromochloromethane	µg/L	0.5	<0.5
Chloroform (THM)	µg/L	0.5	<0.5
2,2-dichloropropane	µg/L	0.5	<0.5
1,2-dichloroethane	µg/L	0.5	<0.5
1,1,1-trichloroethane	µg/L	0.5	<0.5
1,1-dichloropropene	µg/L	0.5	<0.5
Carbon tetrachloride	µg/L	0.5	<0.5
Dibromomethane	µg/L	0.5	<0.5
1,2-dichloropropane	µg/L	0.5	<0.5
Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5
2-nitropropane	µg/L	100	<100
Bromodichloromethane (THM)	µg/L	0.5	<0.5
MIBK (4-methyl-2-pentanone)	µg/L	5	<5
cis-1,3-dichloropropene	µg/L	0.5	<0.5
trans-1,3-dichloropropene	µg/L	0.5	<0.5
1,1,2-trichloroethane	µg/L	0.5	<0.5
1,3-dichloropropane	µg/L	0.5	<0.5
Dibromochloromethane (THM)	µg/L	0.5	<0.5
2-hexanone (MBK)	µg/L	5	<5
1,2-dibromoethane (EDB)	µg/L	0.5	<0.5
Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5
1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5
Chlorobenzene	µg/L	0.5	<0.5
Bromoform (THM)	µg/L	0.5	<0.5
cis-1,4-dichloro-2-butene	µg/L	1	<1
Styrene (Vinyl benzene)	µg/L	0.5	<0.5
1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5
1,2,3-trichloropropane	µg/L	0.5	<0.5
trans-1,4-dichloro-2-butene	µg/L	1	<1

VOCs in Water [AN433] Tested: 13/9/2018 (continued)

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
Isopropylbenzene (Cumene)	µg/L	0.5	<0.5
Bromobenzene	µg/L	0.5	<0.5
n-propylbenzene	µg/L	0.5	<0.5
2-chlorotoluene	µg/L	0.5	<0.5
4-chlorotoluene	µg/L	0.5	<0.5
1,3,5-trimethylbenzene	µg/L	0.5	<0.5
tert-butylbenzene	µg/L	0.5	<0.5
1,2,4-trimethylbenzene	µg/L	0.5	<0.5
sec-butylbenzene	µg/L	0.5	<0.5
1,3-dichlorobenzene	µg/L	0.5	<0.5
1,4-dichlorobenzene	µg/L	0.3	<0.3
p-isopropyltoluene	µg/L	0.5	<0.5
1,2-dichlorobenzene	µg/L	0.5	<0.5
n-butylbenzene	µg/L	0.5	<0.5
1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5
1,2,4-trichlorobenzene	µg/L	0.5	<0.5
Hexachlorobutadiene	µg/L	0.5	<0.5
1,2,3-trichlorobenzene	µg/L	0.5	<0.5
Total VOC	µg/L	10	<10

Volatile Petroleum Hydrocarbons in Water [AN433] Tested: 13/9/2018

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
TRH C6-C9	µg/L	40	<40
Benzene (F0)	µg/L	0.5	<0.5
TRH C6-C10	µg/L	50	<50
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50

TRH (Total Recoverable Hydrocarbons) in Water [AN403] Tested: 12/9/2018

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
TRH C10-C14	µg/L	50	86
TRH C15-C28	µg/L	200	580
TRH C29-C36	µg/L	200	<200
TRH C37-C40	µg/L	200	<200
TRH >C10-C16	µg/L	60	170
TRH >C16-C34 (F3)	µg/L	500	580
TRH >C34-C40 (F4)	µg/L	500	<500
TRH C10-C36	µg/L	450	670
TRH C10-C40	µg/L	650	670
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	170

PAH (Polynuclear Aromatic Hydrocarbons) in Water [AN420] Tested: 12/9/2018

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
Naphthalene	µg/L	0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1
Total PAH (18)	µg/L	1	<1

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 13/9/2018

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
Arsenic, As	µg/L	1	<1
Cadmium, Cd	µg/L	0.1	<0.1
Chromium, Cr	µg/L	1	<1
Copper, Cu	µg/L	1	<1
Lead, Pb	µg/L	1	<1
Nickel, Ni	µg/L	1	6
Zinc, Zn	µg/L	5	7

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 17/9/2018

			QCB200
			WATER
			-
			10/9/2018
			SE183733.001
PARAMETER	UOM	LOR	
Mercury	mg/L	0.0001	<0.0001

METHOD

METHODOLOGY SUMMARY

AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoverable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC's are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

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

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

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

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

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

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

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

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

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This report must not be reproduced, except in full.



STATEMENT OF QA/QC PERFORMANCE

SE183733 R0

CLIENT DETAILS

Contact Rita Bonetti
Client GOLDER ASSOCIATES PTY LTD
Address PO BOX 1302
CROWS NEST NSW 1585

Telephone 02 9478 3900 / 02 9478 3902
Facsimile 02 9478 3901
Email RBonetti@golder.com.au

Project **18105360 - St Leonards Top Spring**
Order Number (Not specified)
Samples 1

LABORATORY DETAILS

Manager Huong Crawford
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference **SE183733 R0**
Date Received 11 Sep 2018
Date Reported 18 Sep 2018

COMMENTS

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

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

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

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

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

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

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Parth)/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156761	10 Sep 2018	11 Sep 2018	08 Oct 2018	17 Sep 2018	08 Oct 2018	18 Sep 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156544	10 Sep 2018	11 Sep 2018	17 Sep 2018	12 Sep 2018	22 Oct 2018	18 Sep 2018

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156606	10 Sep 2018	11 Sep 2018	09 Mar 2019	13 Sep 2018	09 Mar 2019	14 Sep 2018

TRH (Total Recoverable Hydrocarbons) in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156544	10 Sep 2018	11 Sep 2018	17 Sep 2018	12 Sep 2018	22 Oct 2018	18 Sep 2018

VOCs in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156587	10 Sep 2018	11 Sep 2018	17 Sep 2018	13 Sep 2018	23 Oct 2018	17 Sep 2018

Volatile Petroleum Hydrocarbons in Water

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QCB200	SE183733.001	LB156587	10 Sep 2018	11 Sep 2018	17 Sep 2018	13 Sep 2018	23 Oct 2018	17 Sep 2018

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

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

PAH (Polynuclear Aromatic Hydrocarbons) in Water

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	QCB200	SE183733.001	%	40 - 130%	62
d14-p-terphenyl (Surrogate)	QCB200	SE183733.001	%	40 - 130%	82
d5-nitrobenzene (Surrogate)	QCB200	SE183733.001	%	40 - 130%	56

VOCs in Water

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QCB200	SE183733.001	%	40 - 130%	97
d4-1,2-dichloroethane (Surrogate)	QCB200	SE183733.001	%	40 - 130%	102
d8-toluene (Surrogate)	QCB200	SE183733.001	%	40 - 130%	97
Dibromofluoromethane (Surrogate)	QCB200	SE183733.001	%	40 - 130%	104

Volatile Petroleum Hydrocarbons in Water

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QCB200	SE183733.001	%	40 - 130%	94
d4-1,2-dichloroethane (Surrogate)	QCB200	SE183733.001	%	60 - 130%	100
d8-toluene (Surrogate)	QCB200	SE183733.001	%	40 - 130%	98
Dibromofluoromethane (Surrogate)	QCB200	SE183733.001	%	40 - 130%	102

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

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

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Porth)/AN312

Sample Number	Parameter	Units	LOR	Result
LB156761.001	Mercury	mg/L	0.0001	<0.0001

PAH (Polynuclear Aromatic Hydrocarbons) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB156544.001	Naphthalene	µg/L	0.1	<0.1
	2-methylnaphthalene	µg/L	0.1	<0.1
	1-methylnaphthalene	µg/L	0.1	<0.1
	Acenaphthylene	µg/L	0.1	<0.1
	Acenaphthene	µg/L	0.1	<0.1
	Fluorene	µg/L	0.1	<0.1
	Phenanthrene	µg/L	0.1	<0.1
	Anthracene	µg/L	0.1	<0.1
	Fluoranthene	µg/L	0.1	<0.1
	Pyrene	µg/L	0.1	<0.1
	Benzo(a)anthracene	µg/L	0.1	<0.1
	Chrysene	µg/L	0.1	<0.1
	Benzo(a)pyrene	µg/L	0.1	<0.1
	Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
	Dibenzo(ah)anthracene	µg/L	0.1	<0.1
	Benzo(ghi)perylene	µg/L	0.1	<0.1
Surrogates	d5-nitrobenzene (Surrogate)	%	-	60
	2-fluorobiphenyl (Surrogate)	%	-	62
	d14-p-terphenyl (Surrogate)	%	-	76

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB156606.001	Arsenic, As	µg/L	1	<1
	Cadmium, Cd	µg/L	0.1	<0.1
	Chromium, Cr	µg/L	1	<1
	Copper, Cu	µg/L	1	<1
	Lead, Pb	µg/L	1	<1
	Nickel, Ni	µg/L	1	<1
	Zinc, Zn	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Water

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

Sample Number	Parameter	Units	LOR	Result
LB156544.001	TRH C10-C14	µg/L	50	<50
	TRH C15-C28	µg/L	200	<200
	TRH C29-C36	µg/L	200	<200
	TRH C37-C40	µg/L	200	<200

VOCs in Water

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

Sample Number		Parameter	Units	LOR	Result
LB156587.001	Fumigants	2,2-dichloropropane	µg/L	0.5	<0.5
		1,2-dichloropropane	µg/L	0.5	<0.5
		cis-1,3-dichloropropene	µg/L	0.5	<0.5
		trans-1,3-dichloropropene	µg/L	0.5	<0.5
		1,2-dibromoethane (EDB)	µg/L	0.5	<0.5
	Halogenated Aliphatics	Dichlorodifluoromethane (CFC-12)	µg/L	5	<5
		Chloromethane	µg/L	5	<5
		Vinyl chloride (Chloroethene)	µg/L	0.3	<0.3
		Bromomethane	µg/L	10	<10
		Chloroethane	µg/L	5	<5
		Trichlorofluoromethane	µg/L	1	<1
		Iodomethane	µg/L	5	<5
		1,1-dichloroethene	µg/L	0.5	<0.5
		Dichloromethane (Methylene chloride)	µg/L	5	<5
		Allyl chloride	µg/L	2	<2
		trans-1,2-dichloroethene	µg/L	0.5	<0.5
		1,1-dichloroethane	µg/L	0.5	<0.5
		cis-1,2-dichloroethene	µg/L	0.5	<0.5

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

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

VOCs in Water (continued)

Method: ME-(AU)-ENVJAN433

Sample Number		Parameter	Units	LOR	Result	
LB156587.001	Halogenated Aliphatics	Bromochloromethane	µg/L	0.5	<0.5	
		1,2-dichloroethane	µg/L	0.5	<0.5	
		1,1,1-trichloroethane	µg/L	0.5	<0.5	
		1,1-dichloropropene	µg/L	0.5	<0.5	
		Carbon tetrachloride	µg/L	0.5	<0.5	
		Dibromomethane	µg/L	0.5	<0.5	
		Trichloroethene (Trichloroethylene,TCE)	µg/L	0.5	<0.5	
		1,1,2-trichloroethane	µg/L	0.5	<0.5	
		1,3-dichloropropane	µg/L	0.5	<0.5	
		Tetrachloroethene (Perchloroethylene,PCE)	µg/L	0.5	<0.5	
		1,1,1,2-tetrachloroethane	µg/L	0.5	<0.5	
		cis-1,4-dichloro-2-butene	µg/L	1	<1	
		1,1,2,2-tetrachloroethane	µg/L	0.5	<0.5	
		1,2,3-trichloropropane	µg/L	0.5	<0.5	
		trans-1,4-dichloro-2-butene	µg/L	1	<1	
		1,2-dibromo-3-chloropropane	µg/L	0.5	<0.5	
		Hexachlorobutadiene	µg/L	0.5	<0.5	
	Halogenated Aromatics	Chlorobenzene	µg/L	0.5	<0.5	
		Bromobenzene	µg/L	0.5	<0.5	
		2-chlorotoluene	µg/L	0.5	<0.5	
		4-chlorotoluene	µg/L	0.5	<0.5	
		1,3-dichlorobenzene	µg/L	0.5	<0.5	
		1,4-dichlorobenzene	µg/L	0.3	<0.3	
		1,2-dichlorobenzene	µg/L	0.5	<0.5	
		1,2,4-trichlorobenzene	µg/L	0.5	<0.5	
		1,2,3-trichlorobenzene	µg/L	0.5	<0.5	
	Monocyclic Aromatic Hydrocarbons	Benzene	µg/L	0.5	<0.5	
		Toluene	µg/L	0.5	<0.5	
		Ethylbenzene	µg/L	0.5	<0.5	
		m/p-xylene	µg/L	1	<1	
		o-xylene	µg/L	0.5	<0.5	
		Styrene (Vinyl benzene)	µg/L	0.5	<0.5	
		Isopropylbenzene (Cumene)	µg/L	0.5	<0.5	
		n-propylbenzene	µg/L	0.5	<0.5	
		1,3,5-trimethylbenzene	µg/L	0.5	<0.5	
		tert-butylbenzene	µg/L	0.5	<0.5	
		1,2,4-trimethylbenzene	µg/L	0.5	<0.5	
		sec-butylbenzene	µg/L	0.5	<0.5	
		p-isopropyltoluene	µg/L	0.5	<0.5	
		n-butylbenzene	µg/L	0.5	<0.5	
		Nitrogenous Compounds	Acrylonitrile	µg/L	0.5	<0.5
			Oxygenated Compounds	Acetone (2-propanone)	µg/L	10
		MtBE (Methyl-tert-butyl ether)		µg/L	2	<1
		Vinyl acetate		µg/L	10	<10
		MEK (2-butanone)		µg/L	10	<10
		MIBK (4-methyl-2-pentanone)		µg/L	5	<5
		2-hexanone (MBK)		µg/L	5	<5
	Polycyclic VOCs	Naphthalene	µg/L	0.5	<0.5	
	Sulphonated	Carbon disulfide	µg/L	2	<2	
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	94	
		d4-1,2-dichloroethane (Surrogate)	%	-	88	
		d8-toluene (Surrogate)	%	-	98	
		Bromofluorobenzene (Surrogate)	%	-	100	
	Trihalomethanes	Chloroform (THM)	µg/L	0.5	<0.5	
		Bromodichloromethane (THM)	µg/L	0.5	<0.5	
		Dibromochloromethane (THM)	µg/L	0.5	<0.5	
		Bromoform (THM)	µg/L	0.5	<0.5	

Volatile Petroleum Hydrocarbons in Water

Method: ME-(AU)-ENVJAN433

Sample Number	Parameter	Units	LOR
---------------	-----------	-------	-----

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

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

Volatile Petroleum Hydrocarbons in Water (continued)

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

Sample Number	Parameter	Units	LOR	Result
LB156587.001	TRH C6-C9	µg/L	40	<40
	Surrogates			
	Dibromofluoromethane (Surrogate)	%	-	97
	d4-1,2-dichloroethane (Surrogate)	%	-	91
	d8-toluene (Surrogate)	%	-	95
	Bromofluorobenzene (Surrogate)	%	-	100

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Porth)/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183730.009	LB156761.014	Mercury	µg/L	0.0001	<0.0001	<0.0001	200	0

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183733.001	LB156606.014	Arsenic, As	µg/L	1	<1	<1	121	0
		Cadmium, Cd	µg/L	0.1	<0.1	<0.1	200	0
		Chromium, Cr	µg/L	1	<1	<1	165	0
		Copper, Cu	µg/L	1	<1	<1	200	0
		Lead, Pb	µg/L	1	<1	<1	200	0
		Nickel, Ni	µg/L	1	6	6	32	8
		Zinc, Zn	µg/L	5	7	7	85	4
SE183817.013	LB156606.016	Arsenic, As	µg/L	1	<1	-0.005	200	0
		Cadmium, Cd	µg/L	0.1	<0.1	-0.007	200	0
		Chromium, Cr	µg/L	1	<1	0.217	200	0
		Copper, Cu	µg/L	1	<1	-0.214	200	0
		Lead, Pb	µg/L	1	<1	0.035	200	0
		Nickel, Ni	µg/L	1	<1	0.01	200	0
		Zinc, Zn	µg/L	5	<5	2	200	0

VOCs in Water

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183777.011	LB156587.024	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5	<0.5	200	0
			Toluene	µg/L	0.5	<0.5	<0.5	200	0
			Ethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			m/p-xylene	µg/L	1	<1	<1	200	0
			o-xylene	µg/L	0.5	<0.5	<0.5	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	<0.5	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.3	5.3	30	0
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	30	1
			d8-toluene (Surrogate)	µg/L	-	5.0	5.1	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	4.9	4.6	30	6
SE183777.014	LB156587.025	Monocyclic Aromatic	Benzene	µg/L	0.5	<0.5	<0.5	200	0
			Toluene	µg/L	0.5	<0.5	<0.5	200	0
			Ethylbenzene	µg/L	0.5	<0.5	<0.5	200	0
			m/p-xylene	µg/L	1	<1	<1	200	0
			o-xylene	µg/L	0.5	<0.5	<0.5	200	0
		Polycyclic	Naphthalene	µg/L	0.5	<0.5	<0.5	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.3	5.5	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.3	30	1
			d8-toluene (Surrogate)	µg/L	-	5.0	5.2	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.9	4.7	30	3

Volatile Petroleum Hydrocarbons in Water

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %	
SE183777.011	LB156587.024	TRH C6-C10	µg/L	50	<50	<50	200	0	
		TRH C6-C9	µg/L	40	<40	<40	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.3	5.3	30	0
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.2	30	1
			d8-toluene (Surrogate)	µg/L	-	5.0	5.1	30	2
			Bromofluorobenzene (Surrogate)	µg/L	-	4.9	4.6	30	6
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0
SE183777.014	LB156587.025	TRH C6-C10	µg/L	50	<50	<50	200	0	
		TRH C6-C9	µg/L	40	<40	<40	200	0	
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.3	5.5	30	4
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.2	5.3	30	1
			d8-toluene (Surrogate)	µg/L	-	5.0	5.2	30	4
			Bromofluorobenzene (Surrogate)	µg/L	-	4.9	4.7	30	3
		VPH F Bands	Benzene (F0)	µg/L	0.5	<0.5	<0.5	200	0
			TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	200	0

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

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB156544.002	Naphthalene	µg/L	0.1	32	40	60 - 140	80
	Acenaphthylene	µg/L	0.1	31	40	60 - 140	78
	Acenaphthene	µg/L	0.1	33	40	60 - 140	81
	Phenanthrene	µg/L	0.1	36	40	60 - 140	89
	Anthracene	µg/L	0.1	32	40	60 - 140	80
	Fluoranthene	µg/L	0.1	33	40	60 - 140	81
	Pyrene	µg/L	0.1	33	40	60 - 140	82
	Benzo(a)pyrene	µg/L	0.1	33	40	60 - 140	82
	Surrogates						
	d5-nitrobenzene (Surrogate)	µg/L	-	0.3	0.5	40 - 130	66
	2-fluorobiphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	62
	d14-p-terphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	64

Trace Metals (Dissolved) in Water by ICPMS
Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB156606.002	Arsenic, As	µg/L	1	20	20	80 - 120	99
	Cadmium, Cd	µg/L	0.1	20	20	80 - 120	99
	Chromium, Cr	µg/L	1	20	20	80 - 120	100
	Copper, Cu	µg/L	1	21	20	80 - 120	103
	Lead, Pb	µg/L	1	21	20	80 - 120	104
	Nickel, Ni	µg/L	1	20	20	80 - 120	100
	Zinc, Zn	µg/L	5	21	20	80 - 120	105

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB156544.002	TRH C10-C14	µg/L	50	1400	1200	60 - 140	113
	TRH C15-C28	µg/L	200	1400	1200	60 - 140	118
	TRH C29-C36	µg/L	200	1500	1200	60 - 140	125
	TRH F Bands						
	TRH >C10-C16	µg/L	60	1400	1200	60 - 140	118
	TRH >C16-C34 (F3)	µg/L	500	1400	1200	60 - 140	118
	TRH >C34-C40 (F4)	µg/L	500	710	600	60 - 140	119

VOCs in Water
Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB156587.002	Halogenated						
	1,1-dichloroethene	µg/L	0.5	50	45.45	60 - 140	111
	Aliphatics						
	1,2-dichloroethane	µg/L	0.5	50	45.45	60 - 140	110
	Trichloroethene (Trichloroethylene, TCE)	µg/L	0.5	51	45.45	60 - 140	111
	Halogenated						
	Chlorobenzene	µg/L	0.5	51	45.45	60 - 140	111
	Monocyclic						
	Benzene	µg/L	0.5	50	45.45	60 - 140	110
	Aromatic						
	Toluene	µg/L	0.5	51	45.45	60 - 140	112
	Ethylbenzene	µg/L	0.5	51	45.45	60 - 140	111
	m/p-xylene	µg/L	1	100	90.9	60 - 140	112
	o-xylene	µg/L	0.5	51	45.45	60 - 140	111
	Surrogates						
	Dibromofluoromethane (Surrogate)	µg/L	-	4.9	5	60 - 140	98
	d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.7	5	60 - 140	94
	d8-toluene (Surrogate)	µg/L	-	5.5	5	60 - 140	109
	Bromofluorobenzene (Surrogate)	µg/L	-	5.3	5	60 - 140	105
Trihalomethan	Chloroform (THM)	µg/L	0.5	50	45.45	60 - 140	110

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB156587.002	TRH C6-C10	µg/L	50	950	946.63	60 - 140	100
	TRH C6-C9	µg/L	40	770	818.71	60 - 140	94
	Surrogates						
	Dibromofluoromethane (Surrogate)	µg/L	-	4.7	5	60 - 140	94
	d4-1,2-dichloroethane (Surrogate)	µg/L	-	4.7	5	60 - 140	94
	d8-toluene (Surrogate)	µg/L	-	4.9	5	60 - 140	97
	Bromofluorobenzene (Surrogate)	µg/L	-	5.1	5	60 - 140	102
VPH F Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	640	639.67	60 - 140	100

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

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

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Porth)/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183729.001	LB156761.004	Mercury	mg/L	0.0001	0.0075	<0.0001	0.008	94

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183679.001	LB156606.004	Arsenic, As	µg/L	1	24	1	20	116
		Cadmium, Cd	µg/L	0.1	21	<0.1	20	106
		Chromium, Cr	µg/L	1	27	8	20	97
		Copper, Cu	µg/L	1	24	4	20	96
		Lead, Pb	µg/L	1	23	<1	20	110
		Nickel, Ni	µg/L	1	22	1	20	105
		Zinc, Zn	µg/L	5	71	52	20	92

TRH (Total Recoverable Hydrocarbons) in Water

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE183784.003	LB156544.023	TRH C10-C14	µg/L	50	980	0	1200	82
		TRH C15-C28	µg/L	200	1300	0	1200	105
		TRH C29-C36	µg/L	200	1600	0	1200	133
		TRH C37-C40	µg/L	200	<200	0	-	-
		TRH C10-C36	µg/L	450	3800	0	-	-
		TRH C10-C40	µg/L	650	3800	0	-	-
		TRH F Bands	µg/L	60	1100	0	1200	93
		TRH >C10-C16 - Naphthalene (F2)	µg/L	60	1100	0	-	-
		TRH >C16-C34 (F3)	µg/L	500	1400	0	1200	121
		TRH >C34-C40 (F4)	µg/L	500	840	54	600	131

VOCs in Water

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE183777.012	LB156587.023	Monocyclic	Benzene	µg/L	0.5	48	<0.5	45.45	107	
			Aromatic	Toluene	µg/L	0.5	47	<0.5	45.45	104
				Ethylbenzene	µg/L	0.5	44	<0.5	45.45	96
				m/p-xylene	µg/L	1	85	<1	90.9	94
				o-xylene	µg/L	0.5	43	<0.5	45.45	96
		Polycyclic	Naphthalene	µg/L	0.5	53	<0.5	-	-	
			Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.5	-	103
				d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.0	4.8	-	101
				d8-toluene (Surrogate)	µg/L	-	5.2	4.5	-	103
				Bromofluorobenzene (Surrogate)	µg/L	-	5.7	4.8	-	113

Volatile Petroleum Hydrocarbons in Water

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%	
SE183777.012	LB156587.023	TRH C6-C10	µg/L	50	860	<50	946.63	91	
		TRH C6-C9	µg/L	40	690	<40	818.71	84	
		Surrogates	Dibromofluoromethane (Surrogate)	µg/L	-	5.1	4.5	-	103
			d4-1,2-dichloroethane (Surrogate)	µg/L	-	5.0	4.8	-	101
			d8-toluene (Surrogate)	µg/L	-	5.2	4.5	-	103
			Bromofluorobenzene (Surrogate)	µg/L	-	5.7	4.8	-	113
		VPH F	Benzene (F0)	µg/L	0.5	48	<0.5	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	µg/L	50	590	<50	639.67	93

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

- * NATA accreditation does not cover the performance of this service .
 - ** Indicative data, theoretical holding time exceeded.
 - Sample not analysed for this analyte.
 - IS Insufficient sample for analysis.
 - LNR Sample listed, but not received.
 - LOR Limit of reporting.
 - QFH QC result is above the upper tolerance.
 - QFL QC result is below the lower tolerance.
-
- ① At least 2 of 3 surrogates are within acceptance criteria.
 - ② RPD failed acceptance criteria due to sample heterogeneity.
 - ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
 - ④ Recovery failed acceptance criteria due to matrix interference.
 - ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
 - ⑥ LOR was raised due to sample matrix interference.
 - ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
 - ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
 - ⑨ Recovery failed acceptance criteria due to sample heterogeneity.
 - ⑩ LOR was raised due to high conductivity of the sample (required dilution).
 - † Refer to Analytical Report comments for further information.

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client only. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law .

This test report shall not be reproduced, except in full.

APPENDIX H

Data Validation

Project Name:	St Leonards Top Spring	Project Number:	18105360
Primary Laboratory:	ALS Sydney	Work order Number:	ES1825146
Secondary Laboratory:	SGS Alexandria	Work order Number:	SE183109
Sub-contractor Laboratory:	ALS Newcastle (Asbestos)	Work order Number:	ES1825146
Date Sampled:	20-23/08/2018	Sample Medium:	Soil
Sample Information			
Number of Primary Samples:	7	Number of Triplicate Samples:	1
Number of Duplicate Samples:	1	Number of Other QAQC Samples:	2
Documentation and Sample Handling Information			
	Y/N	Comments	
COC completed properly?	Y	Signed by field staff and laboratory personnel	
All requested analysis completed?	Y	All requested analyses on the COC performed by ALS & SGS.	
Samples received intact and chilled?	Y	ALS: Received. 3.2°C. Ice present. SGS: Sample received in good order. 6.3°C, Ice present.	
Samples analysed within appropriate holding times?	Y	All samples were analysed within the appropriate holding times (ALS & SGS).	
Sample volumes sufficient for QC analysis?	Y	Sufficient sample volumes were provided for ALS and SGS laboratory QC analysis	
Are there non-NATA accredited methods used?	Y	SGS is not NATA accredited for total OP pesticides ALS & SGS is NATA accredited for all other methods used in this batch.	
Chromatograms supplied as appropriate?	N/A	N/A.	
Laboratory reports signed by authorised personnel?	Yes	All reports signed authorised personnel.	
QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)			
Type	Sample ID	Comments	
MB	Method Blank	All results were below the LOR (ALS & SGS).	
RB	RB100	All results were below the LOR	
RB	RB101	All results were below the LOR.	
Trip Spike Analyses			
Analyte	Control Spike Concentrations	Trip Spike Concentration	% Recovery
Trip spike not required.			
Laboratory Control Spike (LCS) Analyses			
Analyte Group	Comments		
-	All laboratory control spikes were within laboratory based DQOs (ALS & SGS).		
Matrix Spike (MS) Analyses			
Analyte Group	Comments		
-	All matrix spike recoveries are within acceptable laboratory based DQOs (ALS & SGS).		
Laboratory Duplicates (LD) Analyses			
Analyte Group	Sample ID	Comments	
Heavy metals	SE183180.003	SGS: The laboratory duplicate RPD for arsenic (68%) was outside the acceptable DQOs. <i>Refer to the overall comments</i>	
		All laboratory duplicate RPDs are within acceptable laboratory based DQOs (ALS & SGS).	
Field Duplicates (FD) Analyses			
Analyte Group	Primary ID	Duplicate ID	Comments
-	BH07_0.15	QCA101	All field duplicate RPDs are within acceptable DQOs.
Field Triplicates (FT) Analyses			
Analyte Group	Primary ID	Triplicate ID	Comments
-	BH07_0.15	QCB101	All field triplicate RPDs are within acceptable DQOs.
Surrogate Compound Monitoring Analyses			
Analyte Group	Analyte(s)	Comments	
Phenolic Compound Surrogates	2,4,6-Tribromophenol	ALS: Surrogate recovery for sample ES1825146-004 (BH14_0.1) (37.6%) was less than the lower data quality objective (40-138%). <i>Refer to overall comments.</i>	
		ALS & SGS: All other surrogates recoveries were within acceptable DQOs.	
Overall Comments			
SGS: The laboratory duplicate RPD for arsenic (68%) was outside the acceptable DQOs. It is noted that this sample was from an anonymous batch, therefore is sample is unlikely to be representative of project sample matrices.			
ALS: Surrogate recovery for sample ES1825146-004 (BH14_0.1) (37.6%) was less than the lower data quality objective (40-138%) indicating the potential for underreporting. Overall the exceedance was marginal and is therefore not expected to significantly impact the results.			
This batch has been validated and is considered suitable for environmental interpretive use.			

Performed By: Alex Lemenager
Date: 14/09/2018

Checked By: Rita Bonetti
Date: 19/09/2018

Project: St Leonards Top Spring

Duplicate Analysis RPDs

Project Number: 18105360

Batch/s: ES1825146 / SE183109

Sample ID	BH07_0.15	QCA101	QCB101
Sample Type	Primary	Field Duplicate	Field Triplicate
Date Sampled	17/07/2018	17/07/2018	17/07/2018

Analyte	Units	LOR					RPDs	
							Primary vs Duplicate	Primary vs Triplicate
Moisture	%	1	7.1	6.8	5.9		4.32%	18.46%
TRH								
TRH C6 - C10 Fraction F1	mg/kg	10	<10	<10	<25		ND	ND
TRH C6 - C10 Fraction Less BTEX F1	mg/kg	10	<10	<10	<25		ND	ND
TRH >C10 - C16 Fraction F2	mg/kg	50	<50	<50	<25		ND	ND
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/kg	50	<50	<50	<25		ND	ND
TRH >C16 - C34 Fraction F3	mg/kg	100	<100	<100	<90		ND	ND
TRH >C34 - C40 Fraction F4	mg/kg	100	<100	<100	<120		ND	ND
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/kg	50	<50	<50	<210		ND	ND
TRH C6 - C9 Fraction	mg/kg	10	<10	<10	<20		ND	ND
TRH C10 - C14 Fraction	mg/kg	50	<50	<50	<20		ND	ND
TRH C15 - C28 Fraction	mg/kg	100	<100	<100	51		ND	64.90%
TRH C29 - C36 Fraction	mg/kg	100	<100	<100	<45		ND	ND
TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/kg	50	<50	<50	<110		ND	ND
BTEXN								
Benzene	mg/kg	0.2	<0.2	<0.2	<0.1		ND	ND
Toluene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Ethylbenzene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Xylenes (m & p)	mg/kg	0.5	<0.5	<0.5	<0.2		ND	ND
Xylene (o)	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Xylenes (Sum of total) (Lab Reported)	mg/kg	0.5	<0.5	<0.5	<0.3		ND	ND
Total BTEX	mg/kg	0.2	<0.2	<0.2	<0.6		ND	ND
Metals								
Arsenic	mg/kg	5	<5	<5	1		ND	133.33%
Cadmium	mg/kg	1	<1	<1	<0.3		ND	ND
Chromium	mg/kg	2	5	6	5.1		18.18%	1.98%
Copper	mg/kg	5	5	<5	3.1		0.00%	46.91%
Lead	mg/kg	5	11	17	11		42.86%	0.00%
Mercury	mg/kg	0.1	<0.1	<0.1	<0.05		ND	ND
Nickel	mg/kg	2	<2	<2	<0.5		ND	ND
Zinc	mg/kg	5	11	13	9		16.67%	20.00%
OCPs								
a-BHC	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Aldrin	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Dieldrin	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Aldrin & Dieldrin (Sum of total) (Lab Reported)	mg/kg	0.05	<0.05	<0.05	-		ND	-
b-BHC	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
cis-Chlordane	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
trans-Chlordane	mg/kg	0.05	<0.05	<0.05	-		ND	-
Chlordane (Sum of total)	mg/kg	0.05	<0.05	<0.05	-		ND	-
d-BHC	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
DDD	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
DDE	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
DDT	mg/kg	0.2	<0.2	<0.2	<0.1		ND	ND
DDT+DDE+DDD (Sum of total) (Lab Reported)	mg/kg	0.05	<0.05	<0.05	-		ND	-
Endosulfan	mg/kg	0.05	<0.05	<0.05	-		ND	-
Endosulfan I	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Endosulfan II	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Endosulfan sulphate	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Endrin	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Endrin aldehyde	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Endrin ketone	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
g-BHC	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Heptachlor	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Heptachlor epoxide	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Hexachlorobenzene	mg/kg	0.05	<0.05	<0.05	<0.1		ND	ND
Methoxychlor	mg/kg	0.2	<0.2	<0.2	<0.1		ND	ND
OPPs								
Azinphos-methyl	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Bromophos-ethyl	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Carbophenothion	mg/kg	0.05	<0.05	<0.05	-		ND	-
Chlorfenvinphos	mg/kg	0.05	<0.05	<0.05	-		ND	-
Chlorpyrifos	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Chlorpyrifos-methyl	mg/kg	0.05	<0.05	<0.05	-		ND	-
Demeton-s-methyl	mg/kg	0.05	<0.05	<0.05	-		ND	-
Diazinon	mg/kg	0.05	<0.05	<0.05	<0.5		ND	ND
Dichlorvos	mg/kg	0.05	<0.05	<0.05	<0.5		ND	ND
Dimethoate	mg/kg	0.05	<0.05	<0.05	<0.5		ND	ND
Ethion	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Fenamiphos	mg/kg	0.05	<0.05	<0.05	-		ND	-
Fenthion	mg/kg	0.05	<0.05	<0.05	-		ND	-
Malathion	mg/kg	0.05	<0.05	<0.05	<0.2		ND	ND
Parathion-methyl	mg/kg	0.2	<0.2	<0.2	-		ND	-
Monocrotophos	mg/kg	0.2	<0.2	<0.2	-		ND	-
Parathion	mg/kg	0.2	<0.2	<0.2	<0.2		ND	ND
Pirimphos-ethyl	mg/kg	0.05	<0.05	<0.05	-		ND	-
Prothiofos	mg/kg	0.05	<0.05	<0.05	-		ND	-
PAHs								
Acenaphthene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Acenaphthylene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Anthracene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND
Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	<0.1		ND	ND

Benzo(a)pyrene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Benzo(a)pyrene TEQ (lower bound)*	mg/kg	0.5	<0.5	<0.5	<0.2	ND	ND
Benzo(a)pyrene TEQ (medium bound)*	mg/kg	0.5	0.6	0.6	-	0.00%	-
Benzo(a)pyrene TEQ (upper bound)*	mg/kg	0.5	1.2	1.2	<0.3	0.00%	120.00%
Benzo(b)&(j)fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Chrysene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Fluorene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Naphthalene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Phenanthrene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
Pyrene	mg/kg	0.5	<0.5	<0.5	<0.1	ND	ND
PAH (Sum of Common 16 PAHs - Lab Reported)	mg/kg	0.5	<0.5	<0.5	<0.8	ND	ND
PCB (Sum of Total-Lab Reported)	mg/kg	0.1	<0.1	<0.1	<1	ND	ND

Legend

ND = Not Detected (RPDs not calculated if both primary and duplicate results are below LOR)

-= Not analysed/calculated

Indicates RPD result does not meet the acceptable criteria

Acceptable RPDs:

RPD <= 30%

RPD > 30%, Analysis result < 10 times LOR

RPD <= 50%, Analysis result > 10 times LOR and < 20 times LOR

Project Name:	St Leonards Top Spring	Project Number:	18105360		
Primary Laboratory:	ALS Sydney	Work order Number:	ES1825849		
Secondary Laboratory:	-	Work order Number:	-		
Sub-contractor Laboratory:	ALS Newcastle (asbestos)	Work order Number:	ES1825849		
Date Sampled:	27, 28 & 30/08/2018	Sample Medium:	Soil		
Sample Information					
Number of Primary Samples:	5	Number of Triplicate Samples:	0		
Number of Duplicate Samples:	0	Number of Other QAQC Samples:	2		
Documentation and Sample Handling Information					
	Y/N	Comments			
COC completed properly?	Y	Signed by field staff and laboratory personnel.			
All requested analysis completed?	Y	All requested analyses on the COC performed by ALS.			
Samples received intact and chilled?	Y	Received. 2°C, ice present.			
Samples analysed within appropriate holding times?	Y	All samples were analysed within the appropriate holding times.			
Sample volumes sufficient for QC analysis?	N	Insufficient sample volume provided to ALS to run laboratory duplicate and matrix spikes for the TRH-semivolatile fraction in water. Refer to overall comments. Sufficient volume provided for all other internal QAQC tests.			
Are there non-NATA accredited methods used?	Y	ALS is NATA accredited for all methods used in this batch.			
Chromatograms supplied as appropriate?	N/A	N/A			
Laboratory reports signed by authorised personnel?	Yes	All reports signed authorised personnel.			
QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)					
Type	Sample ID	Comments			
MB	Method Blank	All results were below the LOR.			
RB	RB102	All results were below the LOR.			
RB	RB103	All results were below the LOR.			
Trip Spike Analyses					
Analyte	Control Spike Concentrations	Trip Spike Concentration	% Recovery		
Comments					
Sample ID: No trip spike was required for analysis.					
Laboratory Control Spike (LCS) Analyses					
Analyte Group	Comments				
All	All laboratory control spikes are within acceptable laboratory based DQOs.				
Matrix Spike (MS) Analyses					
Analyte Group	Comments				
All	All matrix spike recoveries are within acceptable laboratory based DQOs.				
Laboratory Duplicates (LD) Analyses					
Analyte Group	Sample ID	Comments			
		All laboratories duplicate recoveries are within acceptable laboratory based DQOs.			
Field Duplicates (FD) Analyses					
Analyte Group	Primary ID	Duplicate ID	Comments		
			No field duplicates required for this batch.		
Field Triplicates (FT) Analyses					
Analyte Group	Primary ID	Triplicate ID	Comments		
			No field triplicates required for this batch.		
Surrogate Compound Monitoring Analyses					
Analyte Group	Analyte(s)	Comments			
		All surrogates recoveries are within acceptable DQOs.			
Overall Comments					
ALS: The quality control frequency for TRH-semivolatile fraction in water were not within specification for laboratory duplicates or matrix spikes. This is not expected to impact the integrity of the data as the only water samples submitted were rinsate (quality control) samples and are not representative of the primary sample matrix (soil).					
This batch has been validated and is considered suitable for environmental interpretive use.					

Performed By: Alex Lemenager
Date: 17/09/2018

Checked By: Tegen Anning
Date: 17/09/2018

Project Name:	St Leonards Top Spring	Project Number:	18105360		
Primary Laboratory:	ALS Sydney	Work order Number:	ES1826279		
Secondary Laboratory:	-	Work order Number:	-		
Sub-contractor Laboratory:	ALS Newcastle (asbestos)	Work order Number:	ES1826279		
Date Sampled:	31/08/2018 & 4/09/2018	Sample Medium:	Soil		
Sample Information					
Number of Primary Samples:	3	Number of Triplicate Samples:	0		
Number of Duplicate Samples:	0	Number of Other QAQC Samples:	1		
Documentation and Sample Handling Information					
	Y/N	Comments			
COC completed properly?	Y	Signed by field staff and laboratory personnel.			
All requested analysis completed?	Y	All requested analyses on the COC performed by ALS.			
Samples received intact and chilled?	Y	ALS: 1.2°C, ice present, security seal intact.			
Samples analysed within appropriate holding times?	Y	All samples were analysed within the appropriate holding times.			
Sample volumes sufficient for QC analysis?	N	Insufficient sample volume provided to ALS to run laboratory duplicate and matrix spikes for the TRH-semivolatile fraction in water. Refer to overall comments.			
Are there non-NATA accredited methods used?	N	ALS is NATA accredited for all methods used in this batch.			
Chromatograms supplied as appropriate?	N/A	N/A			
Laboratory reports signed by authorised personnel?	Yes	All reports signed authorised personnel.			
QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)					
Type	Sample ID	Comments			
MB	Method Blank	All results were below the LOR.			
RB	RB104	All results were below LOR with the exception of chromium (0.002 mg/L), copper (0.003 mg/L) and zinc (0.008 mg/L). Refer to overall comments.			
Trip Spike Analyses					
Analyte	Control Spike Concentrations	Trip Spike Concentration	% Recovery		
No trip spike was required for analysis.					
Laboratory Control Spike (LCS) Analyses					
Analyte Group	Comments				
All	All laboratory control spikes are within acceptable laboratory based DQOs.				
Matrix Spike (MS) Analyses					
Analyte Group	Comments				
All	All matrix spike recoveries are within acceptable laboratory based DQOs.				
Laboratory Duplicates (LD) Analyses					
Analyte Group	Sample ID	Comments			
-	-	All laboratory duplicate recoveries are within acceptable laboratory based DQOs.			
Field Duplicates (FD) Analyses					
Analyte Group	Primary ID	Duplicate ID	Comments		
-	-	-	No field duplicates required for this batch.		
Field Triplicates (FT) Analyses					
Analyte Group	Primary ID	Triplicate ID	Comments		
-	-	-	No field triplicates required for this batch.		
Surrogate Compound Monitoring Analyses					
Analyte Group	Analyte(s)	Comments			
-	-	All surrogates recoveries are within acceptable DQOs.			
Overall Comments					
ALS: The quality control frequency for TRH-semivolatile fraction in water were not within specification for laboratory duplicates or matrix spikes. This is not expected to impact the integrity of the data as the only water samples submitted were rinsate (quality control) samples.					
ALS: Chromium, copper and zinc were detected in rinsate blank RB104. This is not expected to impact the validity of the dataset as the exceedances are considered to be marginally above the LOR (0.001 mg/L, 0.002 mg/L and 0.003 mg/L respectively). Furthermore, the concentrations of the three analytes for the soil samples are generally magnitudes higher than those detected in the rinsate sample.					
This batch has been validated and is considered suitable for environmental interpretive use.					

Performed By: Alex Lemenager
Date: 17/09/2018

Checked By: Rita Bonetti
Date: 2/10/2018

Project Name:	St Leonards Top Spring	Project Number:	18105360		
Primary Laboratory:	ALS Sydney	Work order Number:	ES1826717		
Secondary Laboratory:	SGS Alexandria	Work order Number:	SE183733		
Sub-contractor Laboratory:	-	Work order Number:	-		
Date Sampled:	10/09/2018	Sample Medium:	Water		
Sample Information					
Number of Primary Samples:	3	Number of Triplicate Samples:	1		
Number of Duplicate Samples:	1	Number of Other QAQC Samples:	0		
Documentation and Sample Handling Information					
	Y/N	Comments			
COC completed properly?	Y	Signed by field staff and laboratory personnel.			
All requested analysis completed?	Y	All requested analyses on the COC performed by ALS and SGS.			
Samples received intact and chilled?	Y	ALS: 4.2°C, ice present. SGS: 3.3°C ice present			
Samples analysed within appropriate holding times?	Y	All samples were analysed within the appropriate holding times.			
Sample volumes sufficient for QC analysis?	Y	Sufficient sample volumes were provided for laboratory QC analysis.			
Are there non-NATA accredited methods used?	N	ALS and SGS are NATA accredited for all methods used in this batch.			
Chromatograms supplied as appropriate?	N/A	N/A			
Laboratory reports signed by authorised personnel?	Y	All reports signed authorised personnel.			
QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)					
Type	Sample ID	Comments			
MB	Method Blank	All results were below the LOR.			
Trip Spike Analyses					
Analyte	Control Spike Concentrations	Trip Spike Concentration	% Recovery		
No trip spike was required for analysis					
Laboratory Control Spike (LCS) Analyses					
Analyte Group	Comments				
All	ALS & SGS: All laboratory control spikes are within acceptable laboratory based DQOs.				
Matrix Spike (MS) Analyses					
Analyte Group	Comments				
Sulfate SO ₄ (turbidimetric)	ALS: Matrix spike recovery for sulfate as SO ₄ in sample ES1826622-001 (anonymous) was not determined, background level greater than or equal to 4x spike level (see overall comments).				
-	ALS & SGS: All other matrix spikes were within the acceptable DQOs.				
Laboratory Duplicates (LD) Analyses					
Analyte Group	Sample ID	Comments			
All	-	ALS & SGS: All laboratories duplicate recoveries are within acceptable laboratory based DQOs.			
Field Duplicates (FD) Analyses					
Analyte Group	Primary ID	Duplicate ID	Comments		
-	BH04_180910	QCA200	All field duplicate RPDs are within acceptable DQOs.		
Field Triplicates (FT) Analyses					
Analyte Group	Primary ID	Triplicate ID	Comments		
TRH	BH04_180910	QCB200	The field triplicate RPD for TRH C10-C36 (sum) (115.29%) exceeded the acceptable DQOs (see overall comments). All other field triplicate RPDs are within acceptable DQOs.		
Surrogate Compound Monitoring Analyses					
Analyte Group	Analyte(s)	Comments			
-	-	ALS & SGS: All surrogates recoveries are within acceptable DQOs.			
Overall Comments					
ALS: The matrix spike recovery for sulfate as SO ₄ in an anonymous sample was not determined. Given that the sample was from an anonymous batch and unlikely to be representative of project sample matrices, this is not expected to impact the overall integrity of the batch.					
The field triplicate RPD for TRH C10-C36 (115.29%) exceeded the data quality objectives. Given that there was good correlation between the primary and field duplicate, the high RPD may be attributed to differences in laboratory handling and analytical techniques. The highest results will be adopted for interpretation.					
This batch has been validated and is considered suitable for environmental interpretive use.					

Performed By: Alex Lemenager
Date: 18/09/2018

Checked By: Rita Bonetti
Date: 3/10/2018

Project: St Leonards Top Spring
Duplicate Analysis RPDs
Project Number: 18105360
Batch/s: ES1826717 / SE183733

Sample ID	BH04_180910	QCA200	QCB200
Sample Type	Primary	Field duplicate	Field triplicate
Date Sampled	10/09/2018	10/09/2018	10/09/2018

						RPDs	
Analyte	Units	LOR				Primary vs Duplicate	Primary vs Triplicate
Heavy Metals							
Arsenic (Filtered)	µg/L	1	<1	<1	<1	ND	ND
Cadmium (Filtered)	µg/L	0.1	<0.1	<0.1	<0.1	ND	ND
Chromium (Filtered)	µg/L	1	<1	1	<1	0.00%	ND
Copper (Filtered)	µg/L	1	<1	<1	<1	ND	ND
Lead (Filtered)	µg/L	1	<1	<1	<1	ND	ND
Mercury (Filtered)	µg/L	0.1	<0.1	<0.1	<0.1	ND	ND
Nickel (Filtered)	µg/L	1	6	6	6	0.00%	0.00%
Zinc (Filtered)	µg/L	5	6	6	7	0.00%	15.38%
TRH							
TRH C6 - C10 Fraction F1	mg/L	0.02	<0.02	<0.02	<0.05	ND	ND
TRH C6 - C10 Fraction Less BTEX F1	mg/L	0.02	<0.02	<0.02	<0.05	ND	ND
TRH >C10 - C16 Fraction F2	mg/L	0.1	<0.1	<0.1	0.17	ND	51.85%
TRH >C10 - C16 Fraction Less Naphthalene (F2)	mg/L	0.1	<0.1	<0.1	0.17	ND	51.85%
TRH >C16 - C34 Fraction F3	mg/L	0.1	0.18	0.18	0.58	0.00%	105.26%
TRH >C34 - C40 Fraction F4	mg/L	0.1	<0.1	<0.1	<0.5	ND	ND
TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/L	0.1	0.18	0.18	0.67	0.00%	115.29%
TRH C6 - C9 Fraction	mg/L	0.02	<0.02	<0.02	<0.04	ND	ND
TRH C10 - C14 Fraction	mg/L	0.05	<0.05	<0.05	0.086	ND	52.94%
TRH C15 - C28 Fraction	mg/L	0.1	0.18	0.18	0.58	0.00%	105.26%
TRH C29 - C36 Fraction	mg/L	0.05	<0.05	<0.05	<0.2	ND	ND
TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/L	0.05	0.18	0.18	0.67	0.00%	115.29%
BTEX							
Benzene	µg/L	1	<1	<1	<0.5	ND	ND
Toluene	µg/L	2	<2	<2	<0.5	ND	ND
Ethylbenzene	µg/L	2	<2	<2	<0.5	ND	ND
Xylenes (m & p)	µg/L	2	<2	<2	<1	ND	ND
Xylene (o)	µg/L	2	<2	<2	<0.5	ND	ND
Xylenes (Sum of total) (Lab Reported)	µg/L	2	<2	<2	<1.5	ND	ND
Total BTEX	µg/L	1	<1	<1	<3	ND	ND
PAH							
Acenaphthene	µg/L	1	<1	<1	<0.1	ND	ND
Acenaphthylene	µg/L	1	<1	<1	<0.1	ND	ND
Anthracene	µg/L	1	<1	<1	<0.1	ND	ND
Benz(a)anthracene	µg/L	1	<1	<1	<0.1	ND	ND
Benzo(a)pyrene	µg/L	0.5	<0.5	<0.5	<0.1	ND	ND
Benzo(a)pyrene TEQ (lower bound)*	µg/L	0.5	<0.5	<0.5	-	ND	-
Benzo(b)&(j)fluoranthene	µg/L	1	<1	<1	<0.1	ND	ND
Benzo(g,h,i)perylene	µg/L	1	<1	<1	<0.1	ND	ND
Benzo(k)fluoranthene	µg/L	1	<1	<1	<0.1	ND	ND
Chrysene	µg/L	1	<1	<1	<0.1	ND	ND
Dibenz(a,h)anthracene	µg/L	1	<1	<1	<0.1	ND	ND
Fluoranthene	µg/L	1	<1	<1	<0.1	ND	ND
Fluorene	µg/L	1	<1	<1	<0.1	ND	ND
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	<1	<0.1	ND	ND
Naphthalene	µg/L	1	<1	<1	<0.1	ND	ND
Phenanthrene	µg/L	1	<1	<1	<0.1	ND	ND
Pyrene	µg/L	1	<1	<1	<0.1	ND	ND
PAH (Sum of Common 16 PAHs - Lab Reported)	µg/L	0.5	<0.5	<0.5	<1	ND	ND
Volatile Organic Compounds							
1,4-Dichlorobenzene	µg/L	5	<5	<5	<0.3	ND	ND
4-Chlorotoluene	µg/L	5	<5	<5	<0.5	ND	ND
1,2,3-Trichlorobenzene	µg/L	5	<5	<5	<0.5	ND	ND
1,2,4-Trichlorobenzene	µg/L	5	<5	<5	<0.5	ND	ND
1,2-Dichlorobenzene	µg/L	5	<5	<5	<0.5	ND	ND
1,3-Dichlorobenzene	µg/L	5	<5	<5	<0.5	ND	ND
2-Chlorotoluene	µg/L	5	<5	<5	<0.5	ND	ND
Bromobenzene	µg/L	5	<5	<5	<0.5	ND	ND
Chlorobenzene	µg/L	5	<5	<5	<0.5	ND	ND
1,2,4-trimethylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
1,3,5-Trimethylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
Isopropylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
n-Butylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
n-Propylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
p-Isopropyltoluene	µg/L	5	<5	<5	<0.5	ND	ND
sec-Butylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
Styrene	µg/L	5	<5	<5	<0.5	ND	ND
tert-Butylbenzene	µg/L	5	<5	<5	<0.5	ND	ND
Methyl Ethyl Ketone	µg/L	50	<50	<50	<10	ND	ND
2-Hexanone	µg/L	50	<50	<50	<5	ND	ND
Methyl iso-butyl ketone	µg/L	50	<50	<50	<5	ND	ND
Vinyl acetate	µg/L	50	<50	<50	<10	ND	ND
1,1,1,2-Tetrachloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,1,1-Trichloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,1,2-Trichloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,2,3-Trichloropropane	µg/L	5	<5	<5	<0.5	ND	ND
1,2-Dibromo-3-chloropropane	µg/L	5	<5	<5	<0.5	ND	ND
1,2-Dibromoethane	µg/L	5	<5	<5	<0.5	ND	ND
1,1-Dichloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,2-Dichloroethane	µg/L	5	<5	<5	<0.5	ND	ND
1,1-Dichloroethene	µg/L	5	<5	<5	<0.5	ND	ND

cis-1,2-Dichloroethene	µg/L	5	<5	<5	<0.5	ND	ND
trans-1,2-dichloroethene	µg/L	5	<5	<5	<0.5	ND	ND
1,2-Dichloropropane	µg/L	5	<5	<5	<0.5	ND	ND
1,3-Dichloropropane	µg/L	5	<5	<5	<0.5	ND	ND
2,2-Dichloropropane	µg/L	5	<5	<5	<0.5	ND	ND
1,1-Dichloropropene	µg/L	5	<5	<5	<0.5	ND	ND
cis-1,3-Dichloropropene	µg/L	5	<5	<5	<0.5	ND	ND
trans-1,3-dichloropropene	µg/L	5	<5	<5	<0.5	ND	ND
cis-1,4-Dichloro-2-butene	µg/L	5	<5	<5	<1	ND	ND
trans-1,4-Dichloro-2-butene	µg/L	5	<5	<5	<1	ND	ND
Bromodichloromethane	µg/L	5	<5	<5	<0.5	ND	ND
Bromoform	µg/L	5	<5	<5	<0.5	ND	ND
Bromomethane	µg/L	50	<50	<50	<10	ND	ND
Carbon disulfide	µg/L	5	<5	<5	<2	ND	ND
Carbon tetrachloride	µg/L	5	<5	<5	<0.5	ND	ND
Chlorodibromomethane	µg/L	5	<5	<5	<0.5	ND	ND
Chloroethane	µg/L	50	<50	<50	<5	ND	ND
Chloroform	µg/L	5	<5	<5	<0.5	ND	ND
Chloromethane	µg/L	50	<50	<50	<5	ND	ND
Dibromomethane	µg/L	5	<5	<5	<0.5	ND	ND
Dichlorodifluoromethane	µg/L	50	<50	<50	<5	ND	ND
Hexachlorobutadiene	µg/L	5	<5	<5	<0.5	ND	ND
Iodomethane	µg/L	5	<5	<5	<5	ND	ND
Pentachloroethane	µg/L	5	<5	<5	-	ND	-
Trichloroethene	µg/L	5	<5	<5	<0.5	ND	ND
Tetrachloroethene	µg/L	5	<5	<5	<0.5	ND	ND
Trichlorofluoromethane	µg/L	50	<50	<50	<1	ND	ND
Vinyl chloride	µg/L	50	<50	<50	<0.3	ND	ND

Legend

ND = Not Detected (RPDs not calculated if both primary and duplicate results are below LOR)

-= Not analysed/calculated

Indicates RPD result does not meet the acceptable criteria

***Indicates RPD result does not meet the acceptable criteria due to differences in LOR between laboratories**

Acceptable RPDs:

RPD <= 30%

RPD > 30%, Analysis result < 10 times LOR

RPD <= 50%, Analysis result > 10 times LOR and < 20 times LOR

Project Name:		St Leonards Top Spring		Project Number:		18105360	
Primary Laboratory:		ALS Sydney		Work order Number:		ES1826966	
Secondary Laboratory:		-		Work order Number:		-	
Date Sampled:		30/08/2018		Sample Medium:		Soil	
Sample Information							
Number of Primary Samples:		1		Number of Triplicate Samples:		0	
Number of Duplicate Samples:		0		Number of Other QAQC Samples:		0	
Documentation and Sample Handling Information							
		Y/N		Comments			
COC completed properly?		Y		Sent electronically by Golder personnel. Printed, stamped and signed by laboratory personnel on receipt.			
All requested analysis completed?		Y		All requested analyses on the COC performed by ALS.			
Samples received intact and chilled?		Y		Received. 4.1°C, ice present.			
Samples analysed within appropriate holding times?		Y		All samples were analysed within the appropriate holding times.			
Sample volumes sufficient for QC analysis?		Y		Sufficient sample volumes were provided for ALS laboratory QC analysis.			
Are there non-NATA accredited methods used?		Y		ALS is NATA accredited for all methods used in this batch.			
Chromatograms supplied as appropriate?		N/A		N/A			
Laboratory reports signed by authorised personnel?		Y		All reports signed authorised personnel.			
QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)							
Type		Sample ID		Comments			
MB		Method Blank		All results were below the LOR.			
Trip Spike Analyses							
Analyte	Control Spike Concentrations	Trip Spike Concentration	% Recovery	Comments			
Sample ID: No trip spike was required for analysis.							
Laboratory Control Spike (LCS) Analyses							
Analyte Group		Sample ID		Comments			
All				All laboratory control spikes are within acceptable laboratory based DQOs.			
Matrix Spike (MS) Analyses							
Analyte Group		Sample ID		Comments			
All				All matrix spike recoveries are within acceptable laboratory based DQOs.			
Laboratory Duplicates (LD) Analyses							
Analyte Group		Sample ID		Comments			
-		-		All laboratories duplicate recoveries are within acceptable laboratory based DQOs.			
Field Duplicates (FD) Analyses							
Analyte Group	Primary ID	Duplicate ID	Comments				
-	-	-	No field duplicates required for this batch.				
Field Triplicates (FT) Analyses							
Analyte Group	Primary ID	Triplicate ID	Comments				
-	-	-	No field triplicates required for this batch.				
Surrogate Compound Monitoring Analyses							
Analyte Group	Analyte(s)	Comments					
-	-	No surrogates were required (TCLP metals analysis only undertaken).					
Overall Comments							
ALS: This is a rebatch of ES1825849.							
This batch has been validated and is considered suitable for environmental interpretive use.							

Performed By: Alex Lemenager
Date: 18/09/2018

Checked By: Tegen Anning
Date: 18/09/2018

APPENDIX I

Limitations

The document ("Report") to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd ("Golder") subject to the important limitations and other qualifications set out below.

This Report constitutes or is part of services ("Services") provided by Golder to its client ("Client") under and subject to a contract between Golder and its Client ("Contract"). The contents of this page are not intended to and do not alter Golder's obligations (including any limits on those obligations) to its Client under the Contract.

This Report is provided for use solely by Golder's Client and persons acting on the Client's behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it.

This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose.

The scope of Golder's Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have retained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder's affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification



golder.com