



Final Report (RevA)

Contamination Investigation
Pick & Payless Facility
57 Tattersall Road, Kings Park NSW

24 OCTOBER 2018

Prepared for:

Auto Recyclers Pty Ltd

C/o Barker Ryan Stewart
Suite 603, Level 6, 12 Century Circuit,
(Norwest Business Park)
Baulkham Hills NSW 2153

Proj # SES_483

Prepared/Approved by:

Mr Adam Sullivan

Site Contamination Specialist
Certified Environmental
Practitioner
Certification No. SC40944



This page intentionally left blank

Approval:



.....
Adam Sullivan
Principal Scientist
BSc, Cert. Env. Law
CEnvP-SC #40944

Sullivan Environmental Sciences Pty Ltd

**PO Box 5248
Turrumurra NSW 2074
Australia
E: adam@sullivan-es.com.au
T: 0400 500 264**

Date: **24 October 2018**
Reference: SES_483
Status: Final (RevA)

© Document copyright of Sullivan Environmental Sciences Pty Ltd

No use of the contents, concepts, designs, drawings, specifications, plans etc. included in this report is permitted unless and until they are the subject of a written contract between Sullivan Environmental Sciences Pty Ltd and the addressee of this report. Sullivan Environmental Sciences Pty Ltd accepts no liability of any kind for any unauthorised use of the contents of this report and Sullivan Environmental Sciences Pty Ltd reserves the right to seek compensation for any such unauthorised use.

Document delivery

Sullivan Environmental Sciences Pty Ltd provides this document in either printed format, electronic format or both. Sullivan Environmental Sciences Pty Ltd considers the printed version to be binding. The electronic format is provided for the client's convenience and Sullivan Environmental Sciences Pty Ltd requests that the client ensures the integrity of this electronic information is maintained. Storage of this electronic information should at a minimum comply with the requirements of the Commonwealth Electronic Transactions Act (ETA) 2000.

Where an electronic only version is provided to the client, a signed hard copy of this document is held on file by Sullivan Environmental Sciences Pty Ltd and a copy will be provided if requested.

This page intentionally left blank

Table of Contents

Executive Summary	iii
1 Introduction.....	1
1.1 Our Objective.....	1
1.2 Scope of Work	1
1.3 Regulatory Framework.....	2
1.4 Consultant’s Competency and Certification	2
2 Site Information	3
2.1 Site Description.....	3
2.1.1 Identification.....	3
2.1.2 History and Features	3
2.1.3 Surrounding Land.....	4
2.2 Environmental Setting	4
2.2.1 Topography and Drainage	4
2.2.2 Geology.....	4
2.2.3 Groundwater.....	5
2.3 Previous Investigation	5
2.3.1 January 2014	5
2.3.2 December 2017.....	6
3 Investigation Methodology	7
3.1 Basis to Sampling	7
3.2 Field Sampling Program	8
3.2.1 Sample Analyses	10
3.3 Quality Assurance and Quality Control	11
4 Assessment Criteria.....	13
4.1 Soil Investigation Levels.....	13
4.2 Water Investigation Levels	14
5 Results and Discussion	17
5.1 Soil	17
5.1.1 Field Observations.....	17
5.1.2 Results	17

5.2	Groundwater	18
5.2.1	Field Observations and Quality Parameters	18
5.2.2	Groundwater Flow Gradient	18
5.2.3	Groundwater Results.....	18
5.3	Surface Water	19
5.4	Conceptual Site Model	19
6	Quality of Analytical Data	21
7	Conclusions	23
7.1	Recommendations	23
8	References	25
9	Limitations	27

Tables

Table 3-1	Sampling Locations and Rationale	7
Table 3-2	Soil and Surface Water Sampling Works Summary	8
Table 3-3	Groundwater Sampling Works Summary	8
Table 3-4	Sample Analysis Schedule	10
Table 5-1	Groundwater Field Parameters Summary	18
Table 6-1	Data Quality	21

Appendices

Appendix A	Figures
Appendix B	Results Tables
Appendix C	Borelogs and Soil Descriptions
Appendix D	Field Sheets and Calibration Certificates
Appendix E	Previous Results
Appendix F	Laboratory Analytical Reports

Executive Summary

Auto Recyclers Pty Ltd engaged Sullivan Environmental Sciences Pty Ltd (Sullivan-ES) to conduct a contamination investigation for the Pick & Payless facility at 57 Tattersall Road, Kings Park NSW; henceforth referred to as 'the site'. The site comprises Lot 100 in DP 792731 and covers approximately 6.0 hectares. The site is currently operated as a car recycling and wrecking facility.

It is understood that the site will be subject to a proposed upgrade of facilities to transform the site into a scrap metal recycling yard that could process more than prescribed threshold limits and thus triggering a State Significant Development (SSD) application. Assessing land contamination and establishing baseline conditions under this Investigation forms part of the overall Environmental Impact Statement (EIS) to be prepared for the site.

Our objective was to establish baseline conditions for soil and groundwater quality to complement the findings of the previous investigation (SGA, Jan 2014), and thus examining the suitability of the site to be used for its proposed commercial/industrial use under the SSD application.

The scope of work included: a review of previous reports; a detailed site inspection; drilling and sampling of soil at 22 borehole locations; drilling, installation and sampling of three (3) groundwater monitoring wells; sampling of stormwater outlets; chemical analysis for a suite of contaminants at a NATA accredited laboratory; and preparation of this contamination report in consideration of the Guidelines for Consultants Reporting on Contaminated Sites, 2011 (OEH 2011), Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013), and the State Environmental Planning Policy 55 – Remediation of Land (SEPP55).

The following conclusions and recommendations are made based on the analytical data and field observations resulting from this Investigation, subject to the Limitations presented in Section 9 of this report.

Conclusions

- The findings of this Investigation have established baseline conditions for soil, groundwater and surface water quality at the site and complement findings of previous investigations.
- Concentrations of contaminants in both soil and groundwater samples that were analysed meet the adopted investigation levels, indicating that generally onsite soils and groundwater are unlikely to pose an unacceptable health risk. The site is considered to be suitable for continued use as commercial/industrial land.
- Samples of oil-stained patches across the unsealed spare parts yard show elevated concentrations of hydrocarbons in small localised areas. Samples at SB10 and SS4 (within an oil-stained patch) showed concentrations of hydrocarbons in excess of adopted investigation levels and are considered localised contamination hotspots. Previous results at BH21 and SS3 are also indicative of soils within oil-stained patches and also exceed adopted investigation levels. The oil-stained patches are approximately 1m x 1m (by approximately 0.1-0.2m deep).
- Each oil-stained patch alone would be insignificant and not present a health risk; however, given the vast number of oil-stained patches and large spatial area of the yard, in a collective sense, the oil staining is considered significant to warrant intervention and to protect potential short- and long-term receptors. The oil staining also causes an aesthetic issue that should be addressed.
- Oil-stained patches in the spare parts yard do not preclude the site from being suitable for existing uses or for proposed developments under a commercial/industrial land use, however, the surficial oil stains should be rectified as they pose a long-term contamination source.
- Phthalate esters were detected in previous analytical tests at BH02 (SGA, Jan 2014) and at an additional four locations during this Investigation. All detections are clustered proximal to the car

Executive Summary

shredding area in the southeast corner. The probable source of these chemicals would be artefacts from processing non-metallic vehicle components within the car shredding and floc stockpiling areas. Concentrations in soils are below relevant screening criteria and therefore pose negligible risk.

- Surface water discharging into Breakfast Creek from the two stormwater outlets is impacted by heavy metals and total petroleum hydrocarbons (TPHs). Heavy metals (particularly zinc) are reported at concentrations of up to two orders of magnitude greater than the adopted water quality criteria. Surface water discharging from the site may pose a health risk to the ecological system of Breakfast Creek, as such, abatement measures should be employed during future development of the site to address this issue.

Recommendations

- *Oil-stained soils*: Each oil patch should be excavated and stockpiled within a designated area onsite. The stockpile of excavated soils should be sampled and analysed to classify the soils for offsite waste disposal. A waste classification certificate must be prepared for each waste stream being transported and removed offsite and a summary report should be prepared to document works. An oil absorbent mat should be placed beneath each vehicle stored on unsealed ground to absorb drips and leaks from engine parts as an interim measure until soils can be excavated. This should also be conducted after excavation to prevent further soil contamination by leaking oils.
- *Stormwater*: Improvement in stormwater quality should be addressed during future development of the site. Viable options should include passive and active treatment systems.

Introduction

Auto Recyclers Pty Ltd engaged Sullivan Environmental Sciences Pty Ltd (Sullivan-ES) to conduct a contamination investigation (the Investigation) for the Pick & Payless facility at 57 Tattersall Road, Kings Park NSW; henceforth referred to as 'the site'. The site location is shown on Figure 1 while the current and proposed layout of the site is shown on Figure 2 (**Appendix A**).

The site comprises Lot 100 in DP 792731 and covers approximately 6.0 hectares. The site is currently operated as a car recycling and wrecking facility.

It is understood that the site will be subject to a proposed upgrade of facilities to transform the site into a scrap metal recycling yard that could process more than prescribed threshold limits and thus triggering a State Significant Development (SSD) application. The proposed layout of the new development is shown on Figure 2 (**Appendix A**). Assessing land contamination and establishing baseline conditions under this Investigation forms part of the overall Environmental Impact Statement (EIS) to be prepared for the site.

1.1 Our Objective

Our objective was to establish baseline conditions for soil and groundwater quality to complement the findings of the previous investigation (SGA, Jan 2014), and thus examining the suitability of the site to be used for its proposed commercial/industrial use under the SSD application.

1.2 Scope of Work

The scope of work was designed to build on existing knowledge of the site. As such, the scope of work for the Investigation consisted of the following:

- Reviewing the previous reports (SGA, Jan 2014 and INTEV, Dec 2017) and relevant background information supplied to Sullivan-ES.
- Conducting a detailed site inspection to document current site conditions and surrounding environments.
- Performing an underground pipe survey using Dial Before You Dig plans and a Telstra accredited cable locating surveyor to clear and confirm proposed borehole drilling and sampling locations.
- Conducting field sampling in two stages:
 - o Stage 1 (May 2018) comprised mobilising a mechanical drilling rig and licenced operator to the site, coring the hardstand concrete surface where required to access underlying soils for sampling, drilling and sampling of twelve (12) soil bores at locations supplementary to previous sampling locations, drilling and installing three (3) groundwater monitoring wells and securing with a bolted down steel cover plate, and collecting a sample of groundwater from each of the 3 groundwater monitoring wells.
 - o Stage 2 (Sept/Oct 2018) comprised sampling of surface soils at ten (10) locations in the southern portion of the site targeted at 'floc' stockpiling areas and the car shredding operation, sampling of two (2) x stormwater drain discharge points into the adjoining Breakfast Creek.
- Georeferencing each sampling location with a hand-held GPS unit.
- Establishing ground elevations and groundwater levels to calculate groundwater flow direction.
- Dispatching collected samples of soil, groundwater and surface water to a NATA accredited laboratory and performing laboratory analysis, including QA/QC samples, for the following contaminants:

1 Introduction

- o TPH/TRH – Total Petroleum/Recoverable Hydrocarbons.
 - o BTEXN – benzene, toluene, ethylbenzene, xylenes, and naphthalene.
 - o PAH – Polycyclic Aromatic Hydrocarbons.
 - o Heavy metals.
 - o Phthalate esters.
 - o asbestos (soil only).
- Preparing a contamination report in accordance with the Guidelines for Consultants Reporting on Contaminated Sites, 2011 (OEH 2011), Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013), and the State Environmental Planning Policy 55 – Remediation of Land (SEPP55).

1.3 Regulatory Framework

The Investigation was conducted in consideration of the following regulatory framework and guideline documents:

- Contaminated Land Management Act 1997 (CLM Act).
- State Environmental Planning Policy No.55 – Remediation of Land 1998 (SEPP55).
- National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013).
- Guidelines for Consultants Reporting on Contaminated Sites, 2011 (OEH 2011).
- Sampling Design Guidelines, 1995 (NSW EPA 1995).
- Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017 (NSW EPA 2017).
- Guidelines for the Assessment and Management of Groundwater Contamination, 2007 (NSW DEC 2007).

1.4 Consultant's Competency and Certification

All contamination assessment work was conducted by Sullivan-ES. Our Principal Scientist (Adam Sullivan) is a qualified professional with 20 years' experience in contaminated land assessment and remediation. Adam has achieved tertiary qualifications in Soil Science and Environmental Law. He is also a certified Site Contamination Specialist (CEnvP-SC) (Certification # SC40944) under the EIANZ Certified Environmental Practitioner Scheme (www.cenvp.org).

Site Information

The information provided in this section is summarised from the following sources:

- The previous investigations (SGA, Jan 2014 and INTEV, Dec 2017).
- Information provided by Barker Ryan Stewart on behalf of Auto Recyclers.
- Fieldwork undertaken by Sullivan-ES on 8th, 17th, 18th and 23rd May 2018 (Stage 1); and 24th September, and 4th October 2018 (Stage 2).

2.1 Site Description

2.1.1 Identification

The site is legally identified as Lot 100 in DP DP792731 within land zone 'IN1 General Industrial' (Blacktown Local Environmental Plan 2015) and is approximately 6 hectares (60,000m²) in area.

2.1.2 History and Features

Use of the site for industrial/commercial activities dates back to around the early 1960s. Prior to that, agricultural activities dominated the site and generally across the local region.

The site is currently used as an auto recycling facility (Pick N Payless). The current site layout is shown on Figure 2 and Figure 3 (**Appendix A**) and primarily consists of the following.

Northern area

- Two-storey office building.
- Public and staff car parks.
- Main workshop area comprising:
 - o vehicle dismantling/de-pollution, recovery of oil, petrol, coolant, and diesel
 - o storage of spare parts, batteries, tyres, gas tanks
 - o storage of fuel in an aboveground fuel tank (approx. 10,000L) and bowser
 - o storage of oil in an aboveground waste oil tank (approx. 5,000L)
 - o an oil separation pit (5m x 3m x 2m deep).
- Maintenance and storage building with disused sump pit.
- Demountable office and customer access entry gates.

Central area

- Self-serve spare parts recycling yard.
- Weighbridge.
- At the time of the Investigation the western side was fenced off in preparation for complying development works to be conducted.

Southern area

- Vehicle cutting, crushing and shredding.
- Floc stockpiling (floc is the term used for shredded vehicles once all recoverable components have been removed. Floc typically includes rubber, plastic, vinyl, and some non-ferrous metals).
- Stormwater detention basin and oil water separator.

2 Site Information

The northern portion of the site is predominately sealed with concrete or asphalt, with some landscaped areas. The southern portion of the site is largely unsealed, gravelled surfaces. The main area of the car cutting/shredder has been sealed with concrete as has the weighbridge area.

There were no indications of underground storage tanks (USTs) on the site, however, the previous report (SGA, Jan 2014) conducted a review of relevant records that revealed former licensing information from 1992 for a 5,000L and a 10,000L UST located in the northern area of the site. No further information was available regarding decommissioning activities of either UST. No additional information was obtained from Auto Recyclers during this Investigation. Sullivan-ES were informed that the tanks had been removed prior to the current owner purchasing the site.

In regard to potential legacy contamination caused by USTs, SGA, Jan 2014 stated ... *“While the specific location of the USTs was not able to be identified at the time of investigation, several borehole locations (BH12, BH13, BH19) were drilled in the vicinity of the assumed locations to assess contamination levels (if any). As the laboratory analysis resulted in concentrations below the laboratories limit of reporting it is likely no significant soil contamination as result of former USTs has been identified.”*

2.1.3 Surrounding Land

The site is bordered by the following land uses:

- North Tattersall Road then commercial/industrial businesses.
- South Breakfast Creek then commercial/industrial businesses.
- East A commercial scrap yard business (Sell & Parker).
- West Commercial/industrial businesses.

2.2 Environmental Setting

2.2.1 Topography and Drainage

The site topography falls gently to the south from approximately 45mAHD (metres Australian Height Datum) at the Tattersall Road entrance to approximately 38mAHD along the southern site boundary with Breakfast Creek.

Stormwater generally drains through a network of pipes within the sealed surfaces in the northern area. The majority of unsealed areas are governed by surface overland flow or infiltration. The majority of stormwater would eventually discharge to the stormwater detention pit in the south west area before emptying into Breakfast Creek. This waterway flows west – northwest to connect with Eastern Creek.

The main stormwater discharge is located in the southwest corner. Discharge from here is initially held in the onsite detention pit. A secondary discharge point is located in the southeast corner that captures a small amount of runoff in an open unlined drain from the eastern side of the site.

2.2.2 Geology

The geology underlying the site comprises the upper Triassic aged Bringelly Shale, a sub-group of the Wianamatta Group consisting of shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff (Penrith 1:100,000 Geological Series Sheet 9030, Edition 1, 1991, Department of Minerals and Energy).

2 Site Information

2.2.3 Groundwater

No groundwater bores or monitoring bores have previously been installed onsite. It is understood that groundwater is not a natural resource used on the site.

Localised groundwater flow is inferred to the south/south west towards the adjoining Breakfast Creek.

2.3 Previous Investigation

2.3.1 January 2014

SGA conducted a targeted environmental investigation in January 2014 to “... assess the potential presence of soil contamination at the site resulting from past site use for due diligence purposes.”

The work included a review of background historical information and a program of soil sampling at 21 boreholes and 3 surface samples. The report concluded:

“Sampling and analysis identified that:

- Concentrations of chemicals of concern (COC) within analysed soil samples were below the commercial/industrial site criteria for protection of human health.*
- Concentrations of heavy metals were detected above the Ecological Investigation Levels (EILs), however they are not considered to preclude commercial and industrial activities due to the absence of significant vegetation on site and remediation and validation activities previously undertaken.*
- Based on the results of the investigation, SGA Environmental considers that no evidence has been identified which would limit the ongoing commercial/industrial use of the site from a contamination perspective.”*

Sampling locations conducted by SGA are presented on Figure 3 (**Appendix A**), while the summarised analytical results and laboratory analytical certificates from the previous report are presented in **Appendix E**.

Sullivan-ES has noted the following detections from past sampling in the context of current investigation criteria:

- BH21(1.0-1.1m) - TRH >C₁₀-C₁₆ at a concentration of 1,100mg/kg (this exceeds the HSL¹ criterion - Not Limiting (560mg/kg) and the Management Limit criterion - 1,000mg/kg).
- SS3 - TRH >C₁₆-C₃₄ at a concentration of 15,000mg/kg (this exceeds the Management Limit criterion - 3,500mg/kg).

Further Analysis of Previous Data

The previous report did not document the detection of phthalate esters in their analytical results and did not document the detection of these compounds at location BH02. We have noted that the sample identification appears to have been incorrectly transcribed as BH20 by the laboratory and should be labelled BH02 based on the COC sample register and corresponding analysed suite of chemicals (refer to analytical results and laboratory analytical certificates from the previous report - **Appendix E**)

¹ Health Screening Level.

2 Site Information

The following phthalates were detected at BH02 (0-0.1m):

- Butylbenzylphthalate (BBP) at a concentration of 9mg/kg; and
- Bis(2-ethylhexyl)phthalate (BEHP) at a concentration of 5mg/kg.

These chemicals are typically used as additives to enhance the flexibility of plastics and used in adhesives, sealants, coatings, paints, inks². Noting that BH02 was collected proximal to the car shredding area, the probable source of these chemicals would be artefacts from shredding non-metallic vehicle components within the car shredding and floc stockpiling areas in the southern area of the site, although we have not verified this information.

Based on our own assessment, we note that the detected concentrations were relatively low and below relevant USEPA RSL³ criteria for industrial land.

2.3.2 December 2017

Integrated Environmental conducted water and sediment testing in December 2017 within the stormwater detention basin; the aim of which was to identify the suitability of the water to be discharged into the adjacent water way, and to classify sediments for offsite disposal/reuse. The report made the following conclusions and recommendations:

“The sediment within the retention basin is therefore classified as general solid waste (non-putrescible).

All TPH and BTEX sediment sample results were below the Health Screening levels for commercial/industrial sites. All metals and PAH sediment sample results were below the Health Investigation Levels for commercial/industrial sites.

The results for the water samples collected indicated that total and dissolved zinc and copper levels were above the 95% species protection trigger value taken from ANZECC, 2000.”

“The water from the retention basin is not suitable to be discharged directly into the adjacent waterway. The water is to be discharged over a minimum 4 day period at various locations across the site. Temporary bunds are to be established at the discharge locations to assist with water absorption into the ground and to prevent the water running off into the adjacent creek.

Temporary controls (if possible) are to be put into place to prevent the basin from refilling during rainfall events. These may include temporary diversion bunds upslope of the basin or capping of stormwater inlets.

The day prior to the basin being emptied (when the basin depth is at approximately 0.3 metres) an aquatic ecologist is to be called in to identify and relocate/manage any aquatic fauna present within the basin.

The sediment within the retention basin may be removed from site and disposed of as general solid waste (non-putrescible) or relocated onsite.”

² Australian Government, Department of Health, NICNAS Factsheet Butyl benzyl phthalate (BBP).

³ United States Environmental Protection Agency – Regional Screening Levels (May 2018).

Investigation Methodology

3.1 Basis to Sampling

The sampling approach was based on a judgemental and systematic sampling pattern to target areas proposed for new development and generally across the entire site to establish baseline conditions and complement the findings of the previous investigation (SGA, Jan 2014).

The table below presents the sampling locations and rationale. Soil, groundwater and surface water sampling locations are presented on Figure 3 (**Appendix A**).

Table 3-1 Sampling Locations and Rationale

Location ID	Rationale
SB1	Target proposed End of Vehicle Life (EVL) facility area.
SB2/MW02	Target down-hydraulic gradient of site, general site coverage.
SB3/MW03	Target down-hydraulic gradient of site and spare parts vehicle storage yard, and proposed development area.
SB4	Target car shredder floc stockpile, general site coverage.
SB5	Target proposed development area and spare parts vehicle storage yard.
SB6	Target proposed development area and spare parts vehicle storage yard.
SS4	Target oil-stained patch, proposed development area, and spare parts vehicle storage yard.
SB7/MW01	Target up-hydraulic gradient of site and waste oil tank within proposed EVL area.
SB8	Target spare parts vehicle storage yard and general site coverage.
SB9	Target oil-stained patch, proposed development area, and spare parts vehicle storage yard.
SB10	Target oil-stained patch, proposed development area, and spare parts vehicle storage yard.
SB11	Target proposed development area and spare parts vehicle storage yard, and general site coverage.
SB12	Target proposed development area and spare parts vehicle storage yard, and general site coverage.
SB13, SB14, SB15, SB16, SB17	Target soils surrounding the large floc stockpile.
SB18, SB19	General site coverage in southern area near car shredding operations.
SB20, SB21, SB22	Target soils surrounding the small floc stockpile and eastern open drain.
SW01, SW02	Target stormwater discharge points into Breakfast Creek.

3 Investigation Methodology

3.2 Field Sampling Program

Details of the field sampling program are presented below.

Table 3-2 Soil and Surface Water Sampling Works Summary

Activity/Item	Details
Date of Field Activities	8 th May (site inspection) 2018 17 th and 18 th May 2018 (drilling, sampling and groundwater well installation) 24 th September 2018 (Stage 2 soil sampling) 4 th October 2018 (Stage 2 surface water sampling)
Soil Logging	Soil classifications and descriptions are based on Australian Standard AS1726-1993 Geotechnical Site Investigations. Soil descriptions for the lithology encountered during sampling are presented in the borelogs in Appendix C .
Sampling	Soil samples were taken directly from the push tube liner or end of the solid stem drill bit using nitrile gloves. Surface water samples were collected directly into laboratory supplied containers.
Decontamination Procedures	Sampling tools were decontaminated between sampling locations with potable water and a solution of Decon 90. Nitrile gloves were worn at all times and changed between each soil sample.
Sample Preservation	Samples were placed in laboratory-supplied jars containing appropriate preservatives. Samples were stored on ice in a cooler while on-site and in transit to the laboratory.
Disposal of Soil Cuttings and Materials	Soil cuttings were used to backfill boreholes once samples had been collected. Surplus soils from groundwater bores was placed on garden beds. Single use materials used during sampling were placed into garbage bags and disposed off-site.

Table 3-3 Groundwater Sampling Works Summary

Activity/Item	Details
Date of Field Activities	23 May 2018
Monitoring Well Installation	Groundwater monitoring bores were constructed as 50 mm uPVC wells, with a 0.4 mm aperture slotted section. Wells were installed using <2 mm washed sand filter pack and bentonite pellet seal above the slotted section to isolate the groundwater. Wells were finished at the surface with a concrete seal and a lockable road box. Construction of the groundwater monitoring wells included: • Bore drilling extended to a depth that intercepted the targeted groundwater system. • A length of screen was installed across the intercepted groundwater level.

3 Investigation Methodology

Activity/Item	Details
	• The gravel pack generally extended 1 m above the top of the screened interval. • The bentonite seal extended at least 0.5 m above the gravel pack layer and was hydrated. • the bore annulus above the bentonite seal was backfilled with soil cuttings. • the bore annulus was sealed at the surface with 0.5 m concrete/grout. Each newly installed monitoring well was developed, immediately after installation, to ensure removal of fine particles from the screened interval, to stabilise the annular filter and to maximise the hydraulic efficiency of the monitoring well. A dedicated submersible pump or bailer was used to develop the wells using a surging action. Well development continued until the turbidity of the water improved or the well became dry. The wells were allowed to stabilise for at least 72 hours after development, prior to groundwater sampling.
Water Level Gauging	Water level gauging was undertaken prior to purging/sampling of each well. The gauging point was a small notch or north point on the casing to ensure consistent measurements over time. The groundwater levels in all wells onsite were measured within a 2hr period on the same day to enable a consistent comparison of water levels for the determination of hydraulic gradients and flow directions. The following measurements were taken: • Thickness of non-aqueous phase liquids (NAPL) (if present); • Static water level relative to the top of casing; and • Total depth of well. Measurements were undertaken using an electronic interface probe, which was decontaminated between wells. The measurements were recorded on the groundwater field data sheets Appendix D.
Field Screening – Water Parameters	The water parameters and a physical description of the sample were recorded on the field data sheets (Appendix D). A physical description of the sample was recorded on the field data sheets including: • Colour, turbidity, odour, sheen/films, thickness of phase separated liquids/non-aqueous phase liquids (NAPL), if any. The water parameters were tested in the field at the time samples were collected these included: • pH • electrical conductivity (EC) • temperature (Temp.) • dissolved oxygen (DO) • redox potential (Redox).
Well Purging and Sampling	Purging of monitoring wells was undertaken using a 12V pump or a dedicated bailer. Purging was continued until stable water parameters were achieved or until the bore became dry. A physical description of the sample was recorded on the field data sheet (Appendix D).

3 Investigation Methodology

Activity/Item	Details
	All wells were sampled as soon as practicable following well purging with a disposable bailer. Groundwater samples were transferred into the appropriate sample containers in the following general sequence: • volatile organic compounds; • semi volatile organic compounds; then • inorganic compounds. All samples collected for dissolved metals analysis were field filtered with a 0.45µm filter before being placed into an appropriately preserved sample container. Once filled, all sample containers were tightly capped, then placed into a secure, ice-chilled chest.
Decontamination Procedures	Re-usable equipment, such as the water level meter, water quality meter sensors and pump, were decontaminated before and after each use. The water level meter was rinsed in a solution of Decon 90, and then rinsed in potable water. The water quality meter sensors were rinsed in potable water, and then rinsed in a sample of water to be measured, prior to measuring water quality parameters. Some materials and equipment used for groundwater sampling were single-use and/or dedicated to individual wells.
Sample Preservation	Samples were placed in laboratory-supplied bottles containing appropriate preservatives. Samples were stored on ice in a cooler while on-site and in transit to the laboratory. Samples collected for metals analysis were filtered and put into preserved laboratory supplied bottles.
Disposal of Groundwater and Materials	Groundwater removed during the purging process was stored in buckets and was either returned back to the monitoring well of origin after samples were collected or emptied onto the unsealed ground surface proximal to the well. Single use materials used during sampling were placed into garbage bags and disposed off-site.

3.2.1 Sample Analyses

Samples were analysed in accordance with the table below.

Table 3-4 Sample Analysis Schedule

	TRH/TPH	BTEXN	PAHs	Metals	Asbestos	Phthalate Esters
Primary soil samples	26	26	26	26	11	10
QA/QC – Intra-lab field duplicate	3	3	3	3	--	--
QA/QC – trip blank	--	2	--	--	--	--

3 Investigation Methodology

	TRH/TPH	BTEXN	PAHs	Metals	Asbestos	Phthalate Esters
Primary water samples	5	5	5	5	--	2
QA/QC – Intra-lab field duplicate	2	2	2	2	--	1
Total all samples	36	38	36	36	11	13

Table notes: Total Petroleum/Recoverable Hydrocarbons (TPH/TRH), Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAHs), Metals (As, Cd, Cr (total), Cu, Hg, Ni, Pb, Zn).

3.3 Quality Assurance and Quality Control

Quality Assurance and Quality Control (QA/QC) was governed on the basis of the Data Quality Indicators (DQI) using PARCC parameters as follows:

- Precision: A quantitative measure of the variability (or reproducibility) of data.
- Accuracy: A quantitative measure of the closeness of reported data to the “true” value.
- Representativeness: The confidence (expressed qualitatively) that data are representative of each media present on site.
- Completeness: A measure of the amount of useable data from a data collection activity.
- Comparability: The confidence (expressed qualitatively) that data may be considered to be equivalent for each sampling and analytical event.

The Investigation was completed following standard operating procedures for conducting site contamination investigations. Standards followed included:

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

The data validation adopted for this assessment was based on the following guidance documents:

- Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM 2013).
- Australian Standard 4482.1 Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, 2005.
- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 540-R-10-011, dated January 2010).
- USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 540/R-99/008, dated June 2008).

The data validation process involves the checking of analytical procedure compliance and the assessment of the accuracy and precision of analytical data from a range of quality control

3 Investigation Methodology

measurements generated from both field sampling and analytical programs. Specific elements that have been checked and assessed for this project include:

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

Assessment Criteria

4.1 Soil Investigation Levels

ASC NEPM 2013 Health-based Investigation Levels

The National Environment Protection (Assessment of Site Contamination) Measure 2013 (ASC NEPM 2013) Health-based Investigation Levels (HILs) in Schedule B1 provide a framework that is applicable for assessing human health risk via all relevant pathways of exposure and covers a broad range of metals and organic substances. Different levels are provided for a variety of exposure settings based on the land use scenario at a particular site. The HIL land use criteria adopted for this site were:

- **HIL D:** Commercial and/or industrial including premises such as shops, offices, factories and industrial sites.

ASC NEPM 2013 Health Screening Levels

The ASC NEPM 2013 HILs in Schedule B1 do not provide criteria for petroleum hydrocarbon chemicals, therefore the Health Screening Levels (HSLs) were developed and form part of the ASC NEPM 2013 in Schedule B1. The HSLs are designed to be protective of human health by determining the reasonable maximum exposure from site sources for a range petroleum compounds and fractions commonly encountered on contaminated sites and are applicable to assessing human health risk via the inhalation pathway. The HSLs to be used in this assessment were not adjusted for site specific parameters such as moisture content. HSLs are available for various depth profiles and predominant lithology (sand, silt and clay). HSLs for direct contact were adopted from Table 4 of CRC CARE Technical Report No. 10 by Friebe and Nadebaum (2011). The HSL land use criteria adopted for this site were:

- **HSL D:** Commercial and/or industrial including premises such as shops, offices, factories and industrial sites.

ASC NEPM 2013 Ecological Investigation/Screening Levels

The ASC NEPM 2013 Ecological Investigation Levels and Ecological Screening Levels (EILs and ESLs) in Schedule B1 have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties, whereas ESLs do not, and both are relevant to land use scenarios and apply to the top two metres of soil. EILs take into account soil texture and age of the impacts, whereas ESLs account only for soil texture.

Given that the site is proposed for continued commercial/industrial land use that is proposed to be predominantly sealed by concrete, and the surrounding properties are also used for commercial/industrial purposes, minimal terrestrial ecological receptors are likely to be present on or adjacent to the site. Therefore, soil data was not compared to the EILs or ESLs.

ASC NEPM 2013 Asbestos Health Screening Levels

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

4 Assessment Criteria

Note that the quantitative criteria (i.e. percentage of asbestos materials) were not used in this Investigation given that the asbestos analysis was to determine the presence of asbestos only and not to quantify asbestos materials in soils. Visual identification and subsequent laboratory analysis was used to assess for potential asbestos containing materials (ACMs) such as fibro sheeting.

ASC NEPM 2013 Management Limits

The ASC NEPM 2013 Management Limits in Schedule B1 are relevant for TRH contaminants only. The Management Limits are specific for soil types (coarse and fine) and land uses. If adopted on a site, Management Limits are intended to avoid or minimise the potential effects of the following and require consideration of site-specific factors to determine the maximum depth to which the limits should apply:

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

ASC NEPM 2013 Aesthetic Considerations

In accordance with the ASC NEPM 2013 in Schedule B1 the aesthetic state of sites is required to be taken into account. Aesthetic issues generally relate to the presence of materials with a negligible risk or non-hazardous inert foreign material in soil or fill resulting from human activity. Sites that have been assessed as being acceptable from a human health and environmental perspective may still contain such foreign material. An assessment of the site aesthetics requires consideration of the natural state of soil on any given site, and a comparison between it and the soil encountered during investigations.

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

US EPA Regional Screening Levels

The US EPA provide Regional Screening Levels (RSLs) for all the EPA regions in the United States. The RSLs provide comparison values for residential and commercial/industrial exposures to soil, air, and tap water (drinking water). The RSLs are used when a potential site is initially investigated to understand if potentially significant levels of contamination are present to warrant further investigation.

The US EPA RSLs in an industrial setting for phthalate esters were adopted for this investigation as no guideline values have been developed for Australia.

4.2 Water Investigation Levels

The relevant adopted water investigation levels (WILs) were sourced from the ASC NEPM 2013 and supporting documents. The section below provides information on the adopted WILs. Note the following conditions for using the adopted WILs:

- The values are selected to protect freshwater ecosystems.
- WILs were not corrected for water hardness.
- Human health need only be protected from volatile hydrocarbons through vapour intrusion given that no known potable groundwater resource is present onsite nor proximal to the site.
- Groundwater HSLs for assessing vapour intrusion were selected for groundwater at a depth of >2m to 4m below the ground surface in soil material exhibiting a clay consistency.

4 Assessment Criteria

- Solubility limits were used as screening values when the chemical of concern exhibits Not-Limiting characteristics.

ASC NEPM 2013 HSL

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

ANZG 2018

The Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018 Guidelines) provide Default Guideline Values (DGVs) for organic and inorganic chemicals for the protection of freshwater and marine aquatic ecosystems. For the purposes of this Investigation, the receiving environment of water discharge (both groundwater and surface water) is likely to be a freshwater ecosystem of the headwaters of Eastern Creek, therefore WILs for the protection of freshwater environments were adopted.

This page intentionally left blank

Results and Discussion

5.1 Soil

5.1.1 Field Observations

The following observations were made while sampling soils:

- Fill depth was generally less than 0.5m thick. A maximum thickness of 1.1m was recorded at SB3/MW03.
- Oil staining was prolific on the unsealed ground surfaces across the entire spare parts vehicle yard from leaking engine parts. Staining was observed to be approximately 1m x 1m beneath each vehicle within the yard. Oil staining appeared to be limited to the top 0.1-0.2m.
- Housekeeping was observed to be generally poor in and around the vehicle de-pollution area. Oil and grease stains were prominent in work areas and within drainage lines.
- A very large stockpile of shredded floc is present in the southwestern portion of the site. The size of the stockpile is approximately 70m long by 40m wide by 10m high.
- A second smaller stockpile of floc was formed from the car shredder output chute to its east.
- No fibro fragments were observed on any ground surface or within any fill material at sampled locations.

5.1.2 Results

Soil analytical results are presented in Table 1 (**Appendix B**) and in laboratory reports provided in **Appendix F**.

The results show that all soil sample results meet the adopted soil investigation levels. The exception to this was the following samples:

- SB10_0-0.1m – TRH >C₁₆ - C₃₄ (16,000mg/kg) exceeds the Management Limit (3,500mg/kg).
- SS4_surface - TRH >C₁₆ - C₃₄ (57,800mg/kg) exceeds Human Health criteria for direct contact (27,000mg/kg) and exceeds the Management Limit (3,500mg/kg).
- SS4_surface – TRH F2 >C₁₀ – C₁₆ (560mg/kg) is equivalent to the Soil Saturation (C_{sat}) concentration, thus indicating potential phase separation of this hydrocarbon fraction.

Visible oils on the ground surfaces are evidence of localised contamination hotspots. Sample location SB10 and SS4 were targeted to be representative of oil-stained patches on unsealed ground within the spare parts yard. Alone each stained patch would not pose a potential risk given its limited size; however, collectively the stain patches cover a large area and thus a significant area of impact posing a potential health risk that warrants rectification. Previous results for samples from BH21 and SS3 (refer to section 2.3.1 above) are similarly representative of oil-stained patches within the spare parts yard and support recent findings.

Hydrocarbon concentrations also exceed Management Limits and are considered an aesthetic issue given the visibly blackened surfaces and large area that has been impacted.

Detection of phthalate esters were reported in surface soils around the car shredder (SB19, SB20, SB21 and SB22) which supports the detections found in the previous report at BH02. This area is expected to be a source of phthalates as it is used as the main area for handling and movement of floc, therefore detections of these chemicals would be expected. Concentrations of phthalates in soils are below adopted health criteria guideline values and therefore pose negligible risk.

5 Results and Discussion

5.2 Groundwater

5.2.1 Field Observations and Quality Parameters

The following observations were made while sampling groundwater:

- Groundwater showed no signs of contamination by hydrocarbons.
- Groundwater yield was relatively good. The flow rate was estimated to be approximately 6L/min during pumping.
- Groundwater is non-potable given the relatively high EC readings.

Groundwater field parameters are summarised in Table 5-1 below.

Table 5-1 Groundwater Field Parameters Summary

Well	SWL (mBTOC)	Bore Depth (m)	Stand pipe (m)	Depth to water (mbgl)	Electrical Conductivity (EC) (mS/cm)	pH	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Comments
MW01	1.12	6.47	0.0	1.12	9.44	6.66	20.9	84	2.15	Light grey, turbid, no odours, no sheen, black scum on water surface of bucket.
MW02	1.58	5.44	0.0	1.58	3.65	7.03	22.0	79	6.09	Clear, no odours or sheen.
MW03	1.91	4.54	0.0	1.91	4.37	6.90	22.0	96	1.16	Light brown, turbid, no odours, no sheen.

Table notes: Standing Water Level (SWL), metres below top of casing (mBTOC), metres below ground level (mbgl), micro Siemens per centimetre (uS/cm), milli Volts (mV), milligrams per litre (mg/L).

5.2.2 Groundwater Flow Gradient

Groundwater levels were calculated from measured standing water levels and spot heights from the survey plan of the site (Proust&Gardner, 9 May 2018). Reduced groundwater levels were:

- MW01 – 40.8mAHD
- MW02 – 38.2mAHD
- MW03 – 37.1mAHD

Based on the groundwater elevation, the local flow direction of groundwater appears to be in a south/southwest direction. Note that representative groundwater data is very limited in spatial coverage and additional groundwater bores would be necessary to clearly depict the groundwater potentiometric surface.

5.2.3 Groundwater Results

Groundwater analytical results are presented in Table 2 (**Appendix B**) and in the laboratory reports provided in **Appendix F**.

5 Results and Discussion

Groundwater results show no apparent adverse impacts from site activities. The results show that all groundwater sample results meet the adopted groundwater investigation levels.

5.3 Surface Water

Surface water analytical results are presented in Table 2 (**Appendix B**) and in the laboratory reports provided in **Appendix F**. Previous water sampling results are presented in **Appendix E**.

Concentrations of total metals including cadmium, chromium, copper, lead, nickel and zinc significantly exceed the adopted WILs in both stormwater samples. Metal concentrations in sample SW02 (southwest discharge point) show greater exceedances, in particular zinc at SW02 (0.923mg/L), which is two orders of magnitude greater than the WIL (0.008mg/L). Concentrations of metals in the stormwater are reported at much higher levels than previous sampling (INTEV, Dec 2017).

Detectable concentration of petroleum hydrocarbons (TPH) were reported in both stormwater samples. There are no available WILs for TPH, however, no oily sheen or odours were observed at the time of sampling.

Surface water flowing across the site would contact many impacted surfaces and transport impacted surface waters to stormwater discharge points and offsite. Oil water separators positioned at key locations would intercept and trap gross hydrocarbon impacts, however dissolved phase or sediment entrained inorganic and organic contaminants may flow freely through the stormwater system.

It appears that limited infiltration of surface water is occurring at the site as there were minimal detections of metals or TPHs in groundwater samples.

There were no detections of phthalate esters in stormwater samples.

5.4 Conceptual Site Model

A Conceptual Site Model (CSM) has been developed in consideration of the previous and current results and field observations. The CSM takes into account the future use of the land as commercial and/or industrial as well as offsite land that may be subjected to exposure.

Contamination Sources and Contaminants of Concern

- Surface oil/fuels on sealed and unsealed areas – hydrocarbons.
- Fill material – metals, hydrocarbons.
- Spare parts and shredded vehicle components – hydrocarbons, metals, phthalate esters.

Contaminated Media

- Soil.
- Surface water.
- (Potentially groundwater).

Transport Mechanisms

- Leaching of contaminants to deeper soils (and potentially groundwater).
- Surface water discharges to offsite environments (Breakfast Creek).
- Wind-blown dust.

5 Results and Discussion

Receptors and Exposure Pathway

- Site workers – direct contact with contaminated soils/dust (ingestion and inhalation).
- Offsite ecosystem (Breakfast Creek) - direct contact with contaminated surface water.

Quality of Analytical Data

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

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

Table 6-1 Data Quality

Requirement	Compliance	Comments
Field Duplicates	Yes	Intra-laboratory duplicate samples were collected by splitting a sample into the primary and duplicate sample containers. Greater than 1 duplicate per 10 primary samples was analysed (i.e. >10%) in accordance with AS4482.1: 2005.
RPDs	Yes	All calculated RPDs fall within the acceptable range of <50%, the exception being some metals due to sample heterogeneity of fill material. Where concentrations of either sample is <LOR or <10 times the LOR, then no RPD was calculated. This evaluation is in accordance with section 8 of AS4482.1: 2005.
Blanks	Yes	Two soil trip blank samples were analysed. Results show no detections of volatile chemicals in the blanks.
Sampling equipment properly decontaminated	Yes	Disposable equipment used (bailer, nitrile gloves). Any sampling tools were decontaminated between sampling locations with a solution of Decon 90 and rinsed with potable water.
Sample Preservation	Yes	Samples were properly preserved. Samples were compliant with required storage temperature.
Samples delivered to laboratory within sample holding times.	Yes	Confirmed from COCs and laboratory reports.
Equipment Calibration	Yes	Refer to Appendix D .
Analytical procedures	Yes	All NATA accredited. All analyses meet compliance requirements. One trip blank soil sample was analysed outside holding times. Surrogate recovery outliers existed for three soil samples marginally outside upper limits. Surrogate recovery outliers existed for one water sample marginally outside lower limits.

6 Quality of Analytical Data

Requirement	Compliance	Comments
		Frequency outliers existed for some internal laboratory duplicates and matrix spikes marginally under standard rates. Overall we consider these issues as minor and would not cause the analytical results to be invalid and has no bearing on the interpretation of analytical results.
SOPs and competent field personnel	Yes	Sampling procedures follow industry standards, and field staff (Adam Sullivan – 20 years' experience) are competent in sampling methods and QA/QC protocols.

Conclusions

The following conclusions are made based on the findings of this Investigation; subject to the limitations presented in Section 9:

- The findings of this Investigation have established baseline conditions for soil, groundwater and surface water quality at the site and complement findings of previous investigations.
- Concentrations of contaminants in both soil and groundwater samples that were analysed meet the adopted investigation levels, indicating that generally onsite soils and groundwater are unlikely to pose an unacceptable health risk. The site is considered to be suitable for continued use as commercial/industrial land.
- Samples of oil-stained patches across the unsealed spare parts yard show elevated concentrations of hydrocarbons in small localised areas. Samples at SB10 and SS4 (within an oil-stained patch) showed concentrations of hydrocarbons in excess of adopted investigation levels and are considered localised contamination hotspots. Previous results at BH21 and SS3 are also indicative of soils within oil-stained patches and also exceed adopted investigation levels. The oil-stained patches are approximately 1m x 1m (by approximately 0.1-0.2m deep).
- Each oil-stained patch alone would be insignificant and not present a health risk; however, given the vast number of oil-stained patches and large spatial area of the yard, in a collective sense, the oil staining is considered significant to warrant intervention and to protect potential short- and long-term receptors. The oil staining also causes an aesthetic issue that should be addressed.
- Oil-stained patches in the spare parts yard do not preclude the site from being suitable for existing uses or for proposed developments under a commercial/industrial land use, however, the surficial oil stains should be rectified as they pose a long-term contamination source.
- Phthalate esters were detected in previous analytical tests at BH02 (SGA, Jan 2014) and at an additional four locations during this Investigation. All detections are clustered proximal to the car shredding area in the southeast corner. The probable source of these chemicals would be artefacts from processing non-metallic vehicle components within the car shredding and floc stockpiling areas. Concentrations in soils are below relevant screening criteria and therefore pose negligible risk.
- Surface water discharging into Breakfast Creek from the two stormwater outlets is impacted by heavy metals and total petroleum hydrocarbons (TPHs). Heavy metals (particularly zinc) are reported at concentrations of up to two orders of magnitude greater than the adopted water quality criteria. Surface water discharging from the site may pose a health risk to the ecological system of Breakfast Creek, as such, abatement measures should be employed during future development of the site to address this issue.

7.1 Recommendations

The following recommendations are provided to address contamination issues at the site.

- **Oil-stained soils:** Each oil patch should be excavated and stockpiled within a designated area onsite. The stockpile of excavated soils should be sampled and analysed to classify the soils for offsite waste disposal. A waste classification certificate must be prepared for each waste stream being transported and removed offsite and a summary report should be prepared to document works. An oil absorbent mat should be placed beneath each vehicle stored on unsealed ground to absorb drips and leaks from engine parts as an interim measure until soils can be excavated. This should also be conducted after excavation to prevent further soil contamination by leaking oils.

7 Conclusions

- **Stormwater:** Improvement in stormwater quality should be addressed during future development of the site. Viable options should include passive and active treatment systems.

References

Australia and New Zealand Guidelines for Fresh and Marine Water Quality 2018.

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

Contaminated Land Management Act 1997 (NSW).

Integrated Environmental Pty Ltd, Sediment Classification and Water Testing, December 2017.

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

NSW DEC Guidelines for the Assessment and Management of Groundwater Contamination, 2007.

NSW EPA, Sampling Design Guidelines, 1995.

NSW EPA, Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.

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

SGA Environmental Pty Ltd, Targeted Environmental Investigation, 57 Tattersall Road, Blacktown, January 2014.

State Environmental Planning Policy No.55 – Remediation of Land, 1998.

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

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

USEPA – Regional Screening Levels (May 2018).

This page intentionally left blank

Limitations

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

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

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

This Report was prepared between 19 April and 24 October 2018 and is based on the conditions encountered and information reviewed at the time of preparation. Sullivan-ES disclaims responsibility for any changes that may have occurred after this time.

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

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

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

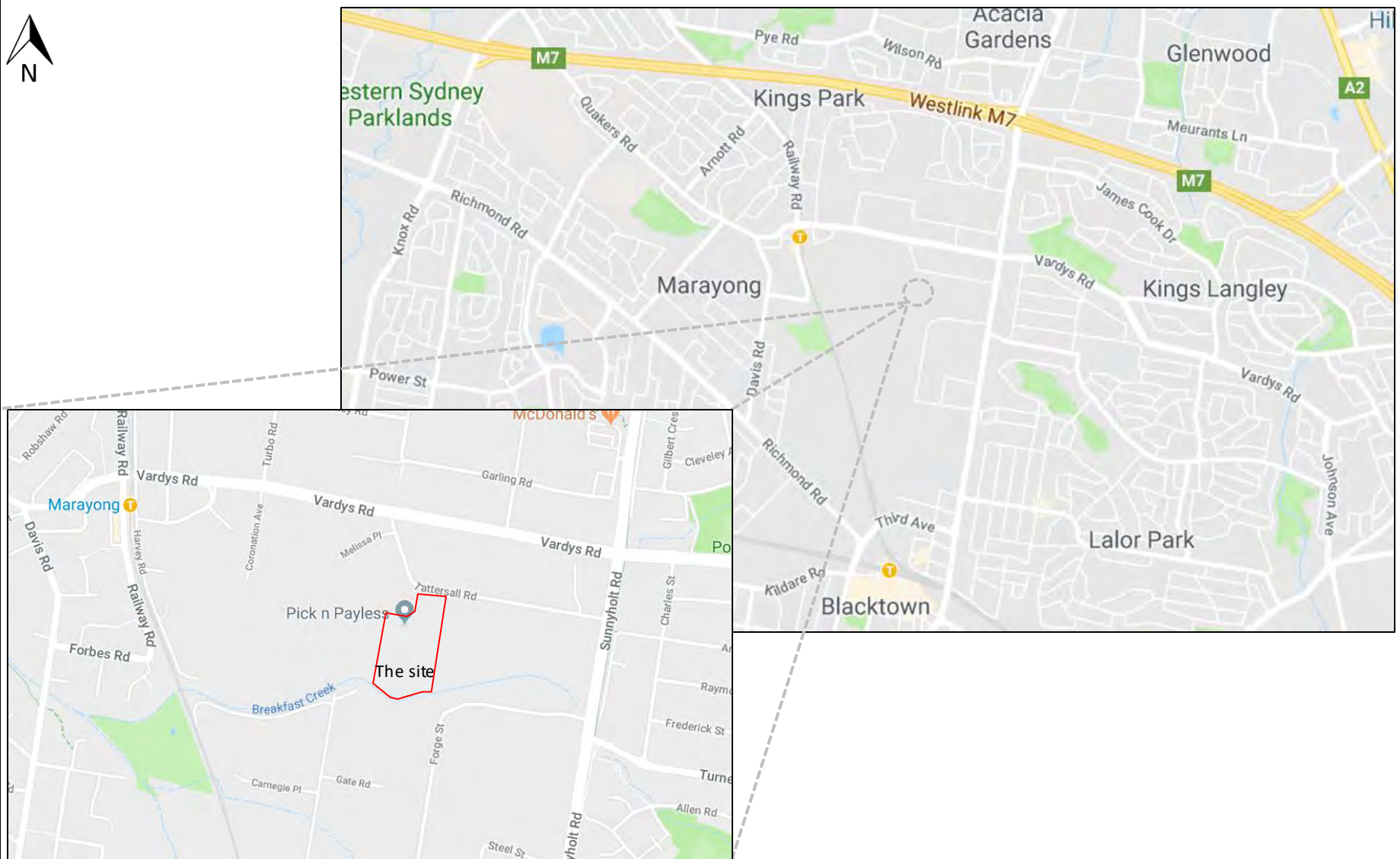
Except as required by law, no third party may use or rely on this Report unless otherwise agreed by Sullivan-ES.

To the extent permitted by law, Sullivan-ES expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. Sullivan-ES does not admit that any action, liability or claim may exist or be available to any third party.

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

This page intentionally left blank

Appendix A Figures



Not to scale Date: 19/10/18

Source: Google Maps 2018

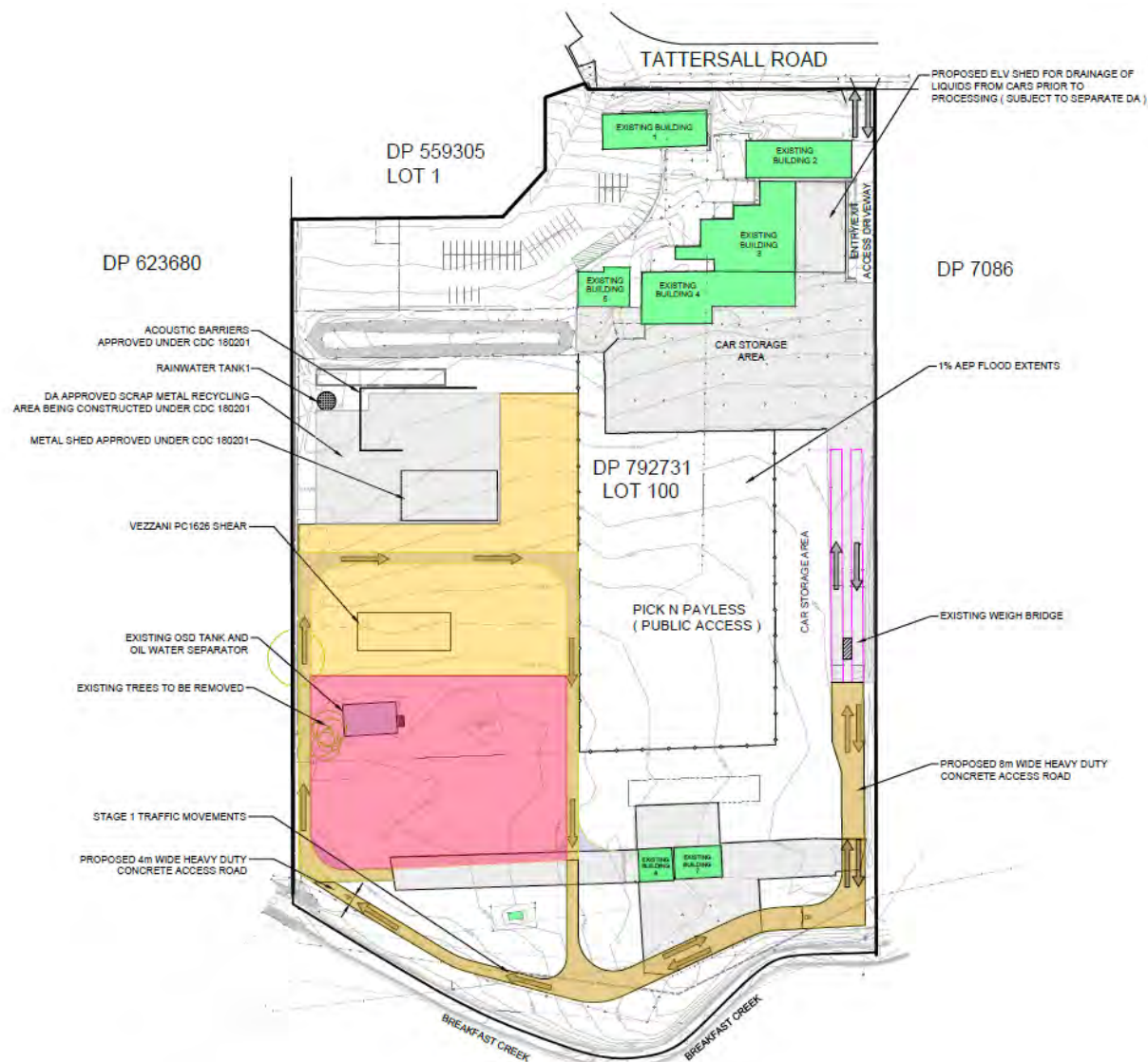


Project #: **SES_483**

Title: **Contamination Investigation (RevA)**

Figure 1: **Site Location**

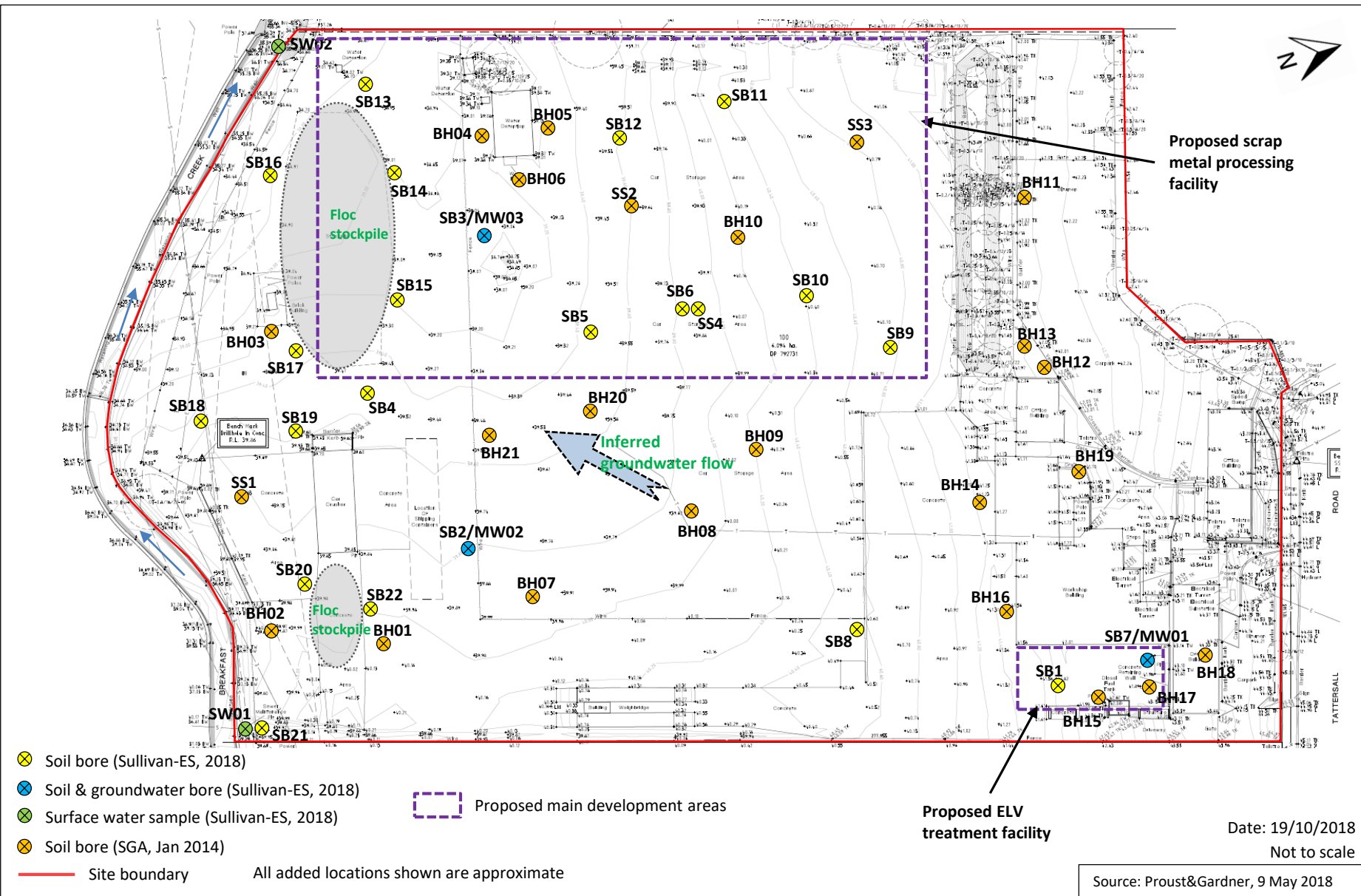
Address: **57 Tattersall Road, Kings Park NSW**



Source: Barker Ryan Stewart
(ref: 160136SSD.01) 13 Sept 2018



Address: **57 Tattersall Road, Kings Park NSW**



	Project #: SES_483	Title: Contamination Investigation (RevA)
	Figure 2: Sampling Locations	Address: 57 Tattersall Road, Kings Park NSW

Appendix B Results Tables

Table 1: Soil Analytical Results
Auto Recyclers Pty Ltd
57 Tattersalls Road, Kings Park NSW
Project # SES_483

Analyte	Moisture	AS 4964 - 2004 Identification of Asbestos in Soils						Total Metals by ICP-AES and FIMS							
		Asbestos (trace)	Asbestos Detected	Asbestos Type	Sample weight (dry)	Description	APPROVED IDENTIFIER:	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Mercury
Units	%	fibres	g/kg	--	g	--	--	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	1	5	0.1	--	0.01	--	--	5	1	2	5	5	2	5	0.1
HIL D	--	Presence	Presence	--	--	--	--	3,000	900	3,600	240,000	1,500	6,000	400,000	730
HSL D Inhalation (<1m)(sand)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL D Contact	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mgmt Limit Comm/Ind	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
USEPA RSLs (2018) - Indust.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample ID	Depth (m)	Date															
SB1_0.2-0.4	0.2-0.4	17/05/2018	12.3	----	----	----	----	----	----	<5	<1	10	47	8	48	58	<0.1
SB2_0-0.1	0-0.1	17/05/2018	5.6	----	----	----	----	----	----	<5	<1	10	52	18	91	77	<0.1
SB2_0.9-1.0	0.9-1.0	17/05/2018	14.2	----	----	----	----	----	----	<5	<1	8	9	<5	2	6	<0.1
QC1	----	17/05/2018	14.0	----	----	----	----	----	----	<5	<1	9	9	<5	2	<5	<0.1
RPD(%)	----	----	1	----	----	----	----	----	----	----	----	12	0	----	0	3	----
SB3_0-0.1	0-0.1	17/05/2018	----	No	No	-	68.2	Mid brown sandy soil.	G.MORGAN	----	----	----	----	----	----	----	----
SB3_1.0-1.2	1.0-1.2	17/05/2018	16.4	----	----	----	----	----	----	<5	<1	15	16	9	9	51	<0.1
SB4_0-0.1	0-0.1	17/05/2018	7.3	No	No	-	53.7	Mid brown sandy soil.	G.MORGAN	<5	<1	12	69	26	78	124	<0.1
SB4_0.4-0.5	0.4-0.5	17/05/2018	15.4	----	----	----	----	----	----	<5	<1	21	95	5	25	52	<0.1
SB5_0-0.1	0-0.1	17/05/2018	6.2	----	----	----	----	----	----	<5	<1	11	40	54	59	101	<0.1
QC2	----	17/05/2018	6.2	----	----	----	----	----	----	<5	<1	12	47	25	58	144	<0.1
RPD(%)	----	----	0	----	----	----	----	----	----	----	----	9	16	73	2	35	----
SB6_0-0.1	0-0.1	17/05/2018	10.5	----	----	----	----	----	----	<5	<1	10	43	14	63	76	<0.1
SB6_1.9-2.0	1.9-2.0	17/05/2018	14.0	----	----	----	----	----	----	<5	<1	8	17	<5	13	27	<0.1
SB7_0.4-0.5	0.4-0.5	18/05/2018	13.2	----	----	----	----	----	----	<5	<1	2	16	<5	17	61	<0.1
SB8_0-0.1	0-0.1	18/05/2018	6.3	----	----	----	----	----	----	<5	<1	9	48	17	90	70	<0.1
SB9_0-0.1	0-0.1	18/05/2018	8.6	No	No	-	49.6	Mid brown sandy soil.	G.MORGAN	<5	<1	11	63	15	90	154	<0.1
SB10_0-0.1	0-0.1	18/05/2018	5.1	No	No	-	80.3	Mid brown sandy soil.	G.MORGAN	<5	<1	11	52	23	86	140	<0.1
SB11_0-0.1	0-0.1	18/05/2018	8.8	No	No	-	57.1	Mid brown sandy soil.	G.MORGAN	<5	<1	25	9	<5	23	21	<0.1
SB12_0-0.1	0-0.1	18/05/2018	----	No	No	-	76.0	Mid brown sandy soil.	G.MORGAN	----	----	----	----	----	----	----	----
SB12_0.3-0.4	0.3-0.4	18/05/2018	7.1	----	----	----	----	----	----	<5	<1	12	<5	5	2	<5	<0.1
SS4	surface	18/05/2018	2.2	----	----	----	----	----	----	<5	<1	10	637	71	66	617	<0.1
TB	----	2/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB13_0.2-0.3	0.2-0.3	24/09/2018	11.4	No	No	-	34.1	Mid brown sandy soil.	G.MORGAN	7	<1	10	31	16	30	37	<0.1
QC4	----	24/09/2018	12.4	----	----	----	----	----	----	12	<1	14	26	37	24	44	<0.1
RPD(%)	----	----	8	----	----	----	----	----	----	53	----	33	18	79	22	17	----
SB14_0.0-0.2	0.0-0.2	24/09/2018	10.4	----	----	----	----	----	----	<5	<1	22	52	41	38	215	<0.1
SB15_0-0.1	0.0-0.1	24/09/2018	8.8	No	No	-	42.6	Mid brown sandy soil.	G.MORGAN	<5	<1	23	89	56	73	495	<0.1
SB16_0-0.1	0.0-0.1	24/09/2018	3.9	----	----	----	----	----	----	<5	<1	11	100	24	105	137	<0.1
SB17_0-0.1	0.0-0.1	24/09/2018	5.8	No	No	-	59.8	Mid brown sandy soil.	G.MORGAN	<5	<1	12	93	26	116	96	<0.1
SB18_0-0.1	0.0-0.1	24/09/2018	4.9	----	----	----	----	----	----	<5	<1	11	82	<5	127	50	<0.1
SB19_0-0.1	0.0-0.1	24/09/2018	9.8	----	----	----	----	----	----	<5	<1	27	2,060	100	66	827	<0.1
SB20_SS	surface	24/09/2018	6.5	----	----	----	----	----	----	<5	2	24	740	1,080	87	12,500	<0.1
SB21_SS	surface	24/09/2018	27.2	No	No	-	21.9	Mid brown sandy soil.	G.MORGAN	6	4	46	349	1,030	100	2,610	0.3
SB22_SS	surface	24/09/2018	4.0	No	No	-	47.5	Mid brown sandy soil.	G.MORGAN	<5	1	30	462	651	105	939	<0.1
T.B.1	----	24/09/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
Chromium - HIL criterion for Cr(VI) used.
Where Not Limiting (NL) criterion occurs for HSLs, then Csat value adopted.
HSL Mgmt Limits - shallow and coarse materials used as variables.

Table 1: Soil Analytical Results
Auto Recyclers Pty Ltd
57 Tattersalls Road, Kings Park NSW
Project # SES_483

Analyte	Total Petroleum Hydrocarbons					Total Recoverable Hydrocarbons - ASC NEPM 2013							BTEXN							
	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	10	50	100	100	50	10	10	50	100	100	50	50	0.2	0.5	0.5	0.5	0.5	0.5	0.2	1
HIL D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL D Inhalation (<1m)(sand)	--	--	--	--	--	--	260	--	--	--	--	NL(560)	3	NL(560)	NL(64)	--	--	230	--	NL(9)
HSL D Contact	--	--	--	--	--	--	26,000	--	27,000	38,000	--	20,000	430	99,000	27,000	--	--	81,000	--	11,000
Mgmt Limit Comm/Ind	--	--	--	--	--	700	--	1,000	3,500	10,000	--	--	--	--	--	--	--	--	--	--
USEPA RSLs (2018) - Indust.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample ID	Depth (m)	Date																				
SB1_0.2-0.4	0.2-0.4	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB2_0-0.1	0-0.1	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB2_0.9-1.0	0.9-1.0	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
QC1	----	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB3_0-0.1	0-0.1	17/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB3_1.0-1.2	1.0-1.2	17/05/2018	<10	<50	110	<100	110	<10	<10	<50	120	<100	120	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB4_0-0.1	0-0.1	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB4_0.4-0.5	0.4-0.5	17/05/2018	<10	<50	470	<100	470	<10	<10	50	500	<100	550	50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB5_0-0.1	0-0.1	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
QC2	----	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB6_0-0.1	0-0.1	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB6_1.9-2.0	1.9-2.0	17/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB7_0.4-0.5	0.4-0.5	18/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB8_0-0.1	0-0.1	18/05/2018	<10	<50	180	<100	180	<10	<10	<50	210	<100	210	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB9_0-0.1	0-0.1	18/05/2018	<10	<50	1,580	820	2,400	<10	<10	<50	2,260	230	2,490	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB10_0-0.1	0-0.1	18/05/2018	<10	<50	12,600	4,090	16,700	<10	<10	150	16,000	1,090	17,200	150	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB11_0-0.1	0-0.1	18/05/2018	<10	<50	110	<100	110	<10	<10	<50	140	<100	140	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB12_0-0.1	0-0.1	18/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB12_0.3-0.4	0.3-0.4	18/05/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SS4	surface	18/05/2018	<10	170	45,100	15,100	60,400	<10	<10	560	57,800	4,120	62,500	560	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
TB	----	2/05/2018	<10	----	----	----	----	<10	<10	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB13_0.2-0.3	0.2-0.3	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
QC4	----	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB14_0.0-0.2	0.0-0.2	24/09/2018	<10	<50	120	<100	120	<10	<10	<50	140	<100	140	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB15_0-0.1	0.0-0.1	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB16_0-0.1	0.0-0.1	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	170	<100	170	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB17_0-0.1	0.0-0.1	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB18_0-0.1	0.0-0.1	24/09/2018	<10	<50	<100	<100	<50	<10	<10	<50	<100	<100	<50	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB19_0-0.1	0.0-0.1	24/09/2018	<10	<50	670	370	1,040	<10	<10	<50	960	170	1,130	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB20_SS	surface	24/09/2018	<10	<50	1,360	820	2,180	<10	<10	<50	1,990	420	2,410	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB21_SS	surface	24/09/2018	<10	<50	610	820	1,430	<10	<10	<50	1,190	540	1,730	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
SB22_SS	surface	24/09/2018	<10	<50	860	760	1,620	<10	<10	<50	1,450	450	1,900	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1
T.B.1	----	24/09/2018	----	----	----	----	----	----	----	----	----	----	----	----	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<1

Notes:
Chromium - HIL criterion for Cr(VI) used.
Where Not Limiting (NL) criterion occurs for HSLs, then Csat value adopted.
HSL Mgmt Limits - shallow and coarse materials used as variables.

Table 1: Soil Analytical Results
Auto Recyclers Pty Ltd
57 Tattersalls Road, Kings Park NSW
Project # SES_483

Analyte	Polycyclic Aromatic Hydrocarbons																				Phthalate Esters					
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3 cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (half LOR)	Benzo(a)pyrene TEQ (LOR)	Dimethyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Butyl benzyl phthalate	bis(2-ethylhexyl) phthalate	Di-n-octylphthalate
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0	0.5	
HIL D	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,000	40	40	40	--	--	--	--	--	--
HSL D Inhalation (<1m)(sand)	NL(9)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HSL D Contact	11,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mgmt Limit Comm/Ind	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
USEPA RSLs (2018) - Indust.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	120,000	660,000	82,000	1,200	160	8,200

Sample ID	Depth (m)	Date																								
SB1_0.2-0.4	0.2-0.4	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB2_0-0.1	0-0.1	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB2_0.9-1.0	0.9-1.0	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
QC1	----	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB3_0-0.1	0-0.1	17/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB3_1.0-1.2	1.0-1.2	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB4_0-0.1	0-0.1	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB4_0.4-0.5	0.4-0.5	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB5_0-0.1	0-0.1	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
QC2	----	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB6_0-0.1	0-0.1	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB6_1.9-2.0	1.9-2.0	17/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB7_0.4-0.5	0.4-0.5	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB8_0-0.1	0-0.1	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB9_0-0.1	0-0.1	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB10_0-0.1	0-0.1	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB11_0-0.1	0-0.1	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SB12_0-0.1	0-0.1	18/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB12_0.3-0.4	0.3-0.4	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
SS4	surface	18/05/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
TB	----	2/05/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB13_0.2-0.3	0.2-0.3	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	<5.0
QC4	----	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	----	----	----	----	----
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SB14_0.0-0.2	0.0-0.2	24/09/2018	<0.5	<0.5	<0.5	<0.5	2.7	0.7	4.2	3.5	1.3	1.1	1.3	0.7	1.2	0.6	<0.5	0.8	18.1	1.6	1.8	2.1	<0.5	<0.5	<0.5	<5.0
SB15_0-0.1	0.0-0.1	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<5.0	<0.5
SB16_0-0.1	0.0-0.1	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<5.0	<0.5
SB17_0-0.1	0.0-0.1	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<5.0	<0.5
SB18_0-0.1	0.0-0.1	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	<5.0	<0.5
SB19_0-0.1	0.0-0.1	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	1.5	30.7	<0.5
SB20_SS	surface	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	0.8	<0.5	2.4	9.5	46.2
SB21_SS	surface	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	2.8	6.2
SB22_SS	surface	24/09/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	2.5	<0.5	1.4	2.4	14.7
T.B.1	----	24/09/2018	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Notes:
Chromium - HIL criterion for Cr(VI) used.
Where Not Limiting (NL) criterion occurs for HSLs, then Csat value adopted.
HSL Mgmt Limits - shallow and coarse materials used as variables.

Table 2: Groundwater and Surface Water Analytical Results
Auto Recyclers Pty Ltd
57 Tattersall Road, Kings Park NSW
Project # SES_483

Analyte	Metals by ICP-MS and FIMS																Total Petroleum Hydrocarbons					Total Recoverable Hydrocarbons - ASC NEPM 2013 Fractions							
	Arsenic (dissolved)	Arsenic (total)	Cadmium (dissolved)	Cadmium (total)	Chromium (dissolved)	Chromium (total)	Copper (dissolved)	Copper (total)	Lead (dissolved)	Lead (total)	Nickel (dissolved)	Nickel (total)	Zinc (dissolved)	Zinc (total)	Mercury (dissolved)	Mercury (total)	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 Fraction (sum)	C6 - C10 Fraction	C6 - C10 Fraction minus BTEX (F1)	>C10 - C16 Fraction	>C16 - C34 Fraction	>C34 - C40 Fraction	>C10 - C40 Fraction (sum)	>C10 - C16 Fraction minus Naphthalene (F2)	
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L		
LOR	0.001		0.0001		0.001		0.001		0.001		0.001		0.005		0.0001	20	50	100	50	50	20	20	100	100	100	100	100		
HSL Inhalation (>2m)(clay)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NL(9,000)	--	--	--	--	NL(3,000)		
GIL Eco	0.013		0.0002		0.001		0.0014		0.0034		0.011		0.008		0.00006	--	--	--	--	--	--	--	--	--	--	--	--		

Sample ID	Date																												
MW01	23/05/2018	0.007	----	<0.0001	----	<0.001	----	<0.001	----	<0.001	----	0.006	----	<0.005	----	<0.0001	----	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
MW02	23/05/2018	<0.001	----	<0.0001	----	<0.001	----	<0.001	----	<0.001	----	0.002	----	<0.005	----	<0.0001	----	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
MW03	23/05/2018	<0.001	----	<0.0001	----	<0.001	----	<0.001	----	<0.001	----	<0.001	----	<0.005	----	<0.0001	----	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
Q01	23/05/2018	<0.001	----	<0.0001	----	<0.001	----	<0.001	----	<0.001	----	<0.001	----	<0.005	----	<0.0001	----	<20	<50	<100	<50	<50	<20	<20	<100	<100	<100	<100	<100
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SW01	4/10/2018	----	0.001	----	0.0009	----	0.008	----	0.064	----	0.201	----	0.012	----	0.586	----	<0.0001	<20	<50	700	170	870	<20	<20	<100	780	<100	780	<100
Q1	4/10/2018	----	0.001	----	0.0009	----	0.008	----	0.065	----	0.205	----	0.013	----	0.580	----	<0.0001	<20	<50	690	130	820	<20	<20	<100	780	<100	780	<100
RPD(%)	----	----	0.0	----	0.0	----	0.0	----	1.6	----	2.0	----	8.0	----	1.0	----	----	----	----	1.4	26.7	5.9	----	----	----	0.0	----	0.0	----
SW02	4/10/2018	----	0.004	----	0.0013	----	0.029	----	0.181	----	0.203	----	0.076	----	0.923	----	<0.0001	<20	<50	1,760	540	2,300	<20	<20	<100	2,060	130	2,190	<100

Notes:
mg/L: milligrams per litre. ug/L: micrograms per litre.
TRH and BTEXN HSLs used for clay material 2m to 4m below ground.
Where Not Limiting (NL) criterion occurs for HSLs, then solubility limit adopted.

Table 2: Groundwater and Surface Water Analytical Results
Auto Recyclers Pty Ltd
57 Tattersall Road, Kings Park NSW
Project # SES_483

Analyte	BTEXN								Polycyclic Aromatic Hydrocarbons																		
	Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Sum of BTEX	Naphthalene	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+i)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Sum of polycyclic aromatic hydrocarbons	Benzo(a)pyrene TEQ (zero)	
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
	1	2	2	2	2	2	1	5	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	0.5	0.5	
	HSL Inhalation (>2m)(clay)	30,000	NL(61,000)	NL(3,900)	--	--	NL(21,000)	--	NL(170)	NL(170)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	GIL Eco	950	--	--	--	--	200	--	16	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Sample ID	Date	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
MW01	23/05/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
MW02	23/05/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
MW03	23/05/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
Q01	23/05/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SW01	4/10/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
Q1	4/10/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5
RPD(%)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SW02	4/10/2018	<1	<2	<2	<2	<2	<2	<1	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<0.5	<0.5

Notes:
mg/L: milligrams per litre. ug/L: micrograms per litre.
TRH and BTEXN HSLs used for clay material 2m to 4m below ground.
Where Not Limiting (NL) criterion occurs for HSLs, then solubility limit adopted.

Table 2: Groundwater and Surface Water Analytical Results
Auto Recyclers Pty Ltd
57 Tattersall Road, Kings Park NSW
Project # SES_483

Analyte	Phthalate Esters						
	Dimethyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Butyl benzyl phthalate	bis(2-ethylhexyl) phthalate	Di-n-octylphthalate	Di (2-ethylhexyl) adipate
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
LOR	2	2	2	2	10	2	2
HSL Inhalation (>2m)(clay)	--	--	--	--	--	--	--
GIL Eco	3,700	1,000	10	--	--	--	--

Sample ID	Date							
MW01	23/05/2018	----	----	----	----	----	----	----
MW02	23/05/2018	----	----	----	----	----	----	----
MW03	23/05/2018	----	----	----	----	----	----	----
Q01	23/05/2018	----	----	----	----	----	----	----
RPD(%)	----	----	----	----	----	----	----	----
SW01	4/10/2018	<2	<2	<2	<2	<10	<2	<2
Q1	4/10/2018	<2	<2	<2	<2	<10	<2	<2
RPD(%)	----	----	----	----	----	----	----	----
SW02	4/10/2018	<2	<2	<2	<2	<10	<2	<2

Notes:
mg/L: milligrams per litre. ug/L: micrograms per litre.
TRH and BTEXN HSLs used for clay material 2m to 4m below ground.
Where Not Limiting (NL) criterion occurs for HSLs, then solubility limit adopted.

Appendix C Borelogs and Soil Descriptions

BOREHOLE LOG


Borehole No:
SB1

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483		
PROJECT: Contamination Investigation			DATE COMMENCED: 17/05/2018		
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 17/05/2018		
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.		
Drill Model: -		Hole Angle: 90 deg	Bore Size: 150mm RL: -		
Drilling Fluid: N/A		Orientation: -	Co-ords: S33.74925 E150.91025		

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub	-	Concrete (0.175m)					
	-	Fill: Gravelly clay, medium plasticity, brown and grey, very gravelly, clay lumps, moist, firm.	M	F		✗	
	0.5	Natural: Clay, high plasticity, red/grey mottled, moist, firm-stiff.	M	F-St		✗	
	-						
	-						
	-						
	1.0	Grey and yellow mottles, minor red ironstone gravels and weathering.	M	F-St			
	-						
	-						
	1.5	Yellow/grey mottled, bands of gravel (weathered zones).	M	St			
	-						
	-						
	2.0	Very stiff - hard material.					
	-						
	-						
2.5	Refusal at 2.5m.						
-							
-							
3.0							
-							
-							
3.5							
-							
-							
4.0							
-							
-							
4.5							
-							
-							
5.0							

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

BOREHOLE LOG


Borehole No:
SB2/MW02

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483				
PROJECT: Contamination Investigation			DATE COMMENCED: 17/05/2018				
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 17/05/2018				
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.				
Drill Model: -		Hole Angle: 90 deg	Bore Size: 150mm RL: -				
Drilling Fluid: N/A		Orientation: -	Co-ords: S33.75069 E150.90960				
Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size,secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Solid stem auger	-	Fill: Roadbase, crushed gravels and fines, minor dark staining.	D	L		✗	Gatic cover and end cap Cement bentonite slurry SWL 1.6mbtoc Bentonite pellet seal Screen Sand filter pack End cap
	-	Becoming shades lighter.				✗	
	1.0	Natural: Clay, medium/high plasticity, brown with dark yellow/grey hues, moist, firm.	M	F	(QC1)	✗	
	-						
	2.0	Becoming weathered zone, shaley.					
	-	Soft drilling. Very moist cuttings, no free water.					
	-	Mottled yellow/grey in brown matrix clays and weathered shales. Moist clay, soft-firm clay.	M	F			
	3.0						
	-						
	4.0	Soft drilling.					
-							
-	5.0						
-	-						
-	6.0	5.7m - Very hard.					
-	-	Wet, free water visible on drill cuttings.					
-	-	Refusal at 6.1m.					
-	7.0						
-	-						
-	8.0						
-	-						
-	9.0						
-	-						
-	10.0						

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

BOREHOLE LOG


Borehole No:
SB3/MW03

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483				
PROJECT: Contamination Investigation			DATE COMMENCED: 17/05/2018				
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 17/05/2018				
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.				
Drill Model: -		Hole Angle: 90 deg	Bore Size: 150mm RL: -				
Drilling Fluid: N/A		Orientation: -	Co-ords: S33.75051 E150.90865				
Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size,secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Solid stem auger	-	Fill: Sandy gravel, dense, large cobble size river stones, rounded.	D	D		✗	Gatic cover and end cap Cement bentonite slurry SWL 1.9mbtoc Bentonite pellet seal Screen Sand filter pack End cap
	-	Greater fines content.					
	1.0	Concrete rubble and scrap metal in a sandy matrix. Very hard drilling.	D	--		✗	
	-	Natural: Clay, medium/high plasticity, brown with dark yellow/grey hues, moist, firm.					
	2.0						
	-	Mottled yellow/grey in brown matrix clays and weathered shales. Moist clay, soft-firm clay.	M	F			
	-	Becoming weathered zone, shaley.					
	3.0						
	-	Soft drilling.					
	-	Becoming damp to wet.					
	4.0						
	5.0	EOH at 5.0m.					
	-						
	6.0						
	-						
	7.0						
	-						
	8.0						
	-						
	9.0						
	-						
	10.0						

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

Borehole No:
SB4

CLIENT: Auto Recyclers Pty Ltd	JOB NUMBER: SES_483
PROJECT: Contamination Investigation	DATE COMMENCED: 17/05/2018
LOCATION: 57 Tattersall Road, Kings Park NSW	DATE COMPLETED: 17/05/2018
DRILL CONTRACTOR: Epoca Environmental Pty Ltd	LOGGED BY: A.S.

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size,secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Pushtub	-	Fill: Roadbase gravels and fines.	D	D		✗	
	-						
	-						
	-						
	-						
	0.5	Fill: Gravelly clay, brown/red colours, moist.	M	F		✗	
	-						
	-						
	-						
	-						
	1.0	Natural: Silty clay, medium plasticity, greeny/brown colouring, moist, some fine sands/silts and softness.	M	F		✗	
	-						
	-						
	-						
	-						
	1.5	End of hole at 2.0m.					
	-						
	-						
	-						
	-						
2.0							
-							
-							
-							
-							
2.5							
-							
-							
-							
-							
3.0							
-							
-							
-							
-							
3.5							
-							
-							
-							
-							
4.0							
-							
-							
-							
-							
4.5							
-							
-							
-							
-							
5.0							
-							
-							
-							
-							

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

BOREHOLE LOG


Borehole No:
SB5

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd **JOB NUMBER:** SES_483
PROJECT: Contamination Investigation **DATE COMMENCED:** 17/05/2018
LOCATION: 57 Tattersall Road, Kings Park NSW **DATE COMPLETED:** 17/05/2018
DRILL CONTRACTOR: Epoca Environmental Pty Ltd **LOGGED BY:** A.S.

Drill Model: - **Hole Angle:** 90 deg **Bore Size:** 150mm RL: -
Drilling Fluid: N/A **Orientation:** - **Co-ords:** S33.75041 E150.90893

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub	-	Fill: Roadbase gravels and sand mixture, dry, dense.	D	D		✗	(QC2)
	0.5	Higher sand content, piece of rotted timber.					
	-	Natural: Silt, low plasticity, grey, moist.	M	F		✗	
	1.0	Silty clay, medium plasticity, becoming greeny/brown colouring, moist, firm.	M	F			
	1.5	Becoming clay, high plasticity, greying hues, moist, stiff.	M	St			
	2.0	End of hole at 2.0m.				✗	
	2.5						
	3.0						
	3.5						
	4.0						
	4.5						
	5.0						

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

Borehole No:
SB6

CLIENT: Auto Recyclers Pty Ltd	JOB NUMBER: SES_483
PROJECT: Contamination Investigation	DATE COMMENCED: 17/05/2018
LOCATION: 57 Tattersall Road, Kings Park NSW	DATE COMPLETED: 17/05/2018
DRILL CONTRACTOR: Epoca Environmental Pty Ltd	LOGGED BY: A.S.

Method/ Casing	Depth (m)	Material Description	Est. Moisture	Est. Consistency	P/D	Sampling	Field Records groundwater, well construction, additional information
Push tub	0.5	Fill: Roadbase gravels and clay mixture, moist, firm. Fill/natural mixture, silty clay becoming prominent.	M	F		✗	Sample SS4 collected 2m N of SB6 on dark oil patch.
	1.0	Natural: Grading to clay, medium plasticity, red/grey mottled, moist, firm.	M	F			
	1.5	Becoming grey/brown mottled, medium plasticity, moist, stiff.	M	St			
	2.0	End of hole at 2.0m.				✗	
	2.5						
	3.0						
	3.5						
	4.0						
	4.5						
	5.0						

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

Borehole No:
SB7/MW01

CLIENT: Auto Recyclers Pty Ltd PROJECT: Contamination Investigation LOCATION: 57 Tattersall Road, Kings Park NSW DRILL CONTRACTOR: Epoca Environmental Pty Ltd			JOB NUMBER: SES_483 DATE COMMENCED: 18/05/2018 DATE COMPLETED: 18/05/2018 LOGGED BY: A.S.				
Drill Model: - Hole Angle: 90 deg Drilling Fluid: N/A Orientation: -			Bore Size: 150mm RL: - Co-ords: S33.74899 E150.91028				
Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size,secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Solid stem auger	-	Concrete (0.35m).					
	-	Fill: rocky rubble then clay and gravel mixture, stiff, moist, slight oily odours.	M	St		✗	Gatic cover and end cap
	-	Natural: Clay, high plasticity, red/grey mottles, moist, firm-stiff.	M	St		✗	SWL 1.1mbtoc
	1.0						
	-						
	-						
	-	Becoming weathered zone, shale, brown					Cement bentonite slurry
	2.0						
	-						
	-						
3.0							
4.0	3.9m - Becoming hard. Brown to pale brown weathered siltstone or fine sandstone.						Bentonite pellet seal
5.0	4.9m - Becoming soft. Shale black. Signs of water, damp cuttings.						Screen
6.0							Sand filter pack
7.0	End of hole at 6.5m.						End cap
8.0							
9.0							
10.0							

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

BOREHOLE LOG


Borehole No:
SB8

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483		
PROJECT: Contamination Investigation			DATE COMMENCED: 18/05/2018		
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 18/05/2018		
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.		
Drill Model: -		Hole Angle: 90 deg	Bore Size: 150mm RL: -		
Drilling Fluid: N/A		Orientation: -	Co-ords: S33.74978 E150.91001		

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub	-	Fill: Roadbase gravels.				✗	(QC3)
	-	Gravelly clay mixture.	M	F			
	-						
	0.5 -					✗	
	-	Natural: Clay, medium plasticity, reddish brown, some gravels, moist, firm.	M	F			
	-						
	1.0 -						
	-						
	-	Wet layer.					
	1.5 -						
	-	Hard gravel layer underlain by soft silty clay, very moist, low plasticity, grey.	M	S			
	-						
	2.0 -					✗	
	-	End of hole at 2.0m.					
	2.5 -						
-							
3.0 -							
-							
3.5 -							
-							
4.0 -							
-							
4.5 -							
-							
5.0							

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

BOREHOLE LOG


Borehole No:
SB9

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483		
PROJECT: Contamination Investigation			DATE COMMENCED: 18/05/2018		
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 18/05/2018		
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.		
Drill Model: -			Hole Angle: 90 deg		Bore Size: 150mm RL: -
Drilling Fluid: N/A			Orientation: -		Co-ords: S33.74957 E150.90898

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub	-	Fill: Thin crust of dark fill, fine gravels (bitumen?). Followed by gravel and sand mixture.	D	D		✗	
	-	Natural: Silty clay, low plasticity, greyish and brown, moist, soft.	M	S			
	-						
	0.5	Becoming medium plasticity, brown, moist, firm.	M	F			
	-						
	-	Silty clay, high silt content, brown, moist, firm.	M	F			
	-						
	1.0						
	-						
	-						
	1.5	Clay, medium plasticity, red/brown/minor grey mottling.	M	F			
	-						
	-						
	2.0	End of hole at 2.0m.					
	-						
	-						
	2.5						
	-						
-							
3.0							
-							
-							
3.5							
-							
-							
4.0							
-							
-							
4.5							
-							
-							
5.0							

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

BOREHOLE LOG


Borehole No:
SB10

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483		
PROJECT: Contamination Investigation			DATE COMMENCED: 18/05/2018		
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 18/05/2018		
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.		
Drill Model: -		Hole Angle: 90 deg	Bore Size: 150mm RL: -		
Drilling Fluid: N/A		Orientation: -	Co-ords: S33.74983 E150.90879		

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub		Fill: Roadbase gravels and sand mixture. Dark stained oil location.	D	D		✗	
		Natural: Silty clay, low plasticity, reddish orange, moist, firm.	M	F			
						✗	
	0.5	Becoming medium plasticity, red/grey mottled.	M	F			
	1.0						
	1.5	Grading to clay, medium plasticity, yellow/grey mottling, moist, firm-stiff.	M	St			
	2.0	End of hole at 2.0m.					
	2.5						
	3.0						
3.5							
4.0							
4.5							
5.0							

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

Borehole No:
SB11

CLIENT: Auto Recyclers Pty Ltd PROJECT: Contamination Investigation LOCATION: 57 Tattersall Road, Kings Park NSW DRILL CONTRACTOR: Epoca Environmental Pty Ltd			JOB NUMBER: SES_483 DATE COMMENCED: 18/05/2018 DATE COMPLETED: 18/05/2018 LOGGED BY: A.S.				
Drill Model: - Hole Angle: 90 deg Drilling Fluid: N/A Orientation: -			Bore Size: 150mm RL: - Co-ords: S33.74988 E150.90829				
Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size,secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub		Fill: Thin layer of gravels.	D	D		✗	
		Natural: Silty clay, low plasticity, reddish orange, moist, firm.	M	F			
	0.5		M	F			
		Silty clay as above.				✗	
	1.0						
	1.5	Grading to clay, medium plasticity, yellow/grey mottling, moist, firm-stiff.	M	St			
	2.0	End of hole at 2.0m.					
	2.5						
	3.0						
	3.5						
	4.0						
	4.5						
	5.0						

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

BOREHOLE LOG


Borehole No:
SB12

Sheet 1 of 1

CLIENT: Auto Recyclers Pty Ltd			JOB NUMBER: SES_483		
PROJECT: Contamination Investigation			DATE COMMENCED: 18/05/2018		
LOCATION: 57 Tattersall Road, Kings Park NSW			DATE COMPLETED: 18/05/2018		
DRILL CONTRACTOR: Epoca Environmental Pty Ltd			LOGGED BY: A.S.		
Drill Model: -			Hole Angle: 90 deg		Bore Size: 150mm RL: -
Drilling Fluid: N/A			Orientation: -		Co-ords: S33.75016 E150.90817

Method/ Casing	Depth (m)	Material Description type, colour/mottling, plasticity/particle size, secondary/minor components	Est. Moisture	Est. Consistency	PID	Sampling	Field Records groundwater, well construction, additional information
Push tub	-	Fill: Roadbase gravels and fines.	D	D		✗	
	-	Natural: Silt, very low plasticity, pale brown, dry, soft.	D	S		✗	
	-						
	0.5						
	-						
	-						
	-	Becoming silty clay, higher clay content, moist.	M	S			
	1.0						
	-						
	-						
	-						
	1.5						
	-	Silty clay, low plasticity, light/pale brown, moist, soft.	M	S			
	-						
	-						
	2.0	End of hole at 2.0m.					
	-						
	-						
2.5							
-							
-							
-							
3.0							
-							
-							
-							
3.5							
-							
-							
-							
4.0							
-							
-							
-							
4.5							
-							
-							
-							
5.0							

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

Sample Location	Date	Sample Depth	Material Description	GPS CoOrdinates	
				Latitude	Longitude
SB13/QC4	24/09/2018	0.2-0.3	Silty clay and gravel mixture, very hard	S33.75082	E150.90805
SB14	24/09/2018	0.0-0.2	Roadbase over silty clay and gravel/sand mixture, very hard	S33.75072	E150.90841
SB15	24/09/2018	0.0-0.1	Gravel, sand and clay mixture, very hard	S33.75079	E150.90876
SB16	24/09/2018	0.0-0.1	Roadbase gravel and brick, refusal	S33.75106	E150.90836
SB17	24/09/2018	0.0-0.1	Roadbase gravel and brick, refusal	S33.75115	E150.90882
SB18	24/09/2018	0.0-0.1	Roadbase gravel and brick, refusal	S33.75139	E150.90907
SB19	24/09/2018	0.0-0.1	Gravel and clay mixture, refusal on concrete lump	S33.75114	E150.90914
SB20	24/09/2018	surface	Shale grave, hard compacted, refusal	S33.75116	E150.90971
SB21	24/09/2018	surface	Silty loam, soft (from drain)	S33.75134	E150.90997
SB22	24/09/2018	surface	Surface gravels and fines, very hard/refusal	S33.75096	E150.90976
SW01	4/10/2018	----	Water	----	----
SW02	4/10/2018	----	Water	----	----

Appendix D Field Sheets and Calibration Certificates

PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: SB7/MW01

Project No SES-483 Project Name Cont. Invest.

Date 28/5/18 Sampled by: A.S.

Development

Development Method Bailer

Time Started

Time Stopped

Comments ✓ turbid

SWL (start)

SWL (end)

Volume Removed

Discharge Rate

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes thickness)

Purging

Purge Method

Time Started

Time Stopped

Comments

Purge Depth

SWL (start)

SWL (end)

Bore Volume

Volume Removed

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes thickness)

Sampling

Sampling Method

Time Started

Time Stopped

Comments

Sampling Depth

SWL (start)

SWL (end)

OVA Monitoring

Time	Ambient	Bore Head	Discharge

Field Analyses

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Comments (Color, turbidity)
	20L	8.65mS	6.63	20.7	115	2.07ppm	✓ grey/dark, turbid, no ads, black sand on surface
	40L	9.48mS	6.70	20.8	101	2.75	
	60L	9.44	6.66	20.9	84	2.15	A little lighter & less turbid. of bucket

PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: SB02/MW02

Project No SES483 Project Name Cent. Invest.

Date 23/5/18 Sampled by: A.S.

Development

Development Method
Time Started
Time Stopped
Comments

Bailer - 18/5/18
-
-
very turbid -

SWL (start)
SWL (end)

Volume Removed
Discharge Rate

Bore Depth (start)
Bore Depth (end)
NAPL Present
(If yes thickness)

Purging

Purge Method
Time Started
Time Stopped
Comments

12V
10:40

Purge Depth
SWL (start)
SWL (end)

Bore Volume
Bore Volume Removed

Bore Depth (start)
Bore Depth (end)
NAPL Present
(If yes thickness)

1.58 mlt toe
2.30 mlt quick volume removed
Purge spluttering at 25L. Full drawdown + recharge, potential turbulence.

Sampling

Sampling Method
Time Started
Time Stopped
Comments

Sampling Depth
SWL (start)
SWL (end)

OVA Monitoring

Time	Ambient	Bore Head	Discharge

Field Analyses

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
	20L	3.66mS	7.03	22.4	89	5.43ppm	5.43ppm	brown turbid, no ODS no sheen
	40L	3.80	7.07	21.6	84	7.91	7.91	same, less turbid.
	60L	3.79	7.04	22.0	83	8.22	8.22	much less turbid.
11am	80L	3.65	7.03	22.0	79	6.09	6.09	Relat. clear

PURGING AND GROUNDWATER SAMPLING DATA SHEET

BORE No: SB2/MW03
(Q01)

Project No SES_483 Project Name Cont. Invest.

Date 23/5/18 Sampled by: A.S.

Development

Development Method

Time Started

Time Stopped

Comments

Bailer - 18/5/18

SWL (start)

SWL (end)

very turbid - sediment laden

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes thickness)

Volume Removed

Discharge Rate

30L

Purging

Purge Method

Time Started

Time Stopped

Comments

Purge Depth

SWL (start)

SWL (end)

very good yield = 1L/10 sec?

Bore Depth (start)

Bore Depth (end)

NAPL Present

(If yes thickness)

Bore Volume

Volume Removed

4.54 m³ to 10C
~~1.91 m³ to 10C~~
~~4.5~~

Sampling

Sampling Method

Time Started

Time Stopped

Comments

Sampling Depth

SWL (start)

SWL (end)

OVA Monitoring

Time	Ambient	Bore Head	Discharge

Field Analyses

Time	Vol Removed (L)	EC (uS/cm)	pH	T (C)	Redox (mV)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments (Color, turbidity)
	<u>20L</u>	<u>4.15ms</u>	<u>6.85</u>	<u>21.2</u>	<u>121</u>		<u>0.94ppm</u>	<u>brown turbid. no odor, no sheen.</u>
	<u>40L</u>	<u>4.28</u>	<u>6.88</u>	<u>21.6</u>	<u>109</u>		<u>0.92</u>	<u>" " slight less turbid</u>
	<u>60L</u>	<u>4.42</u>	<u>6.87</u>	<u>21.8</u>	<u>100</u>		<u>1.36</u>	<u>" "</u>
<u>9:50</u>	<u>80L</u>	<u>4.37</u>	<u>6.90</u>	<u>22.0</u>	<u>96</u>		<u>1.16</u>	<u>" "</u>

RENTALS

Equipment Certification Report – TPS 90FLMV Water Quality Meter

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

Sensor	Concentration	Span 1	Span 2	Traceability Lot #	Pass?
pH	pH 7.00 / pH 4.00	7.00 pH	4.00 pH	310933/312725	☒
Conductivity	12.88mS/cm	0.0 mS/cm	12.88 mS/cm	316592	☒
TDS	36 ppk	0.0 ppk	36 ppk	313394	☒
Dissolved Oxygen	Sodium Sulphite / Air	ppm in Sodium Sulphite	8.94 ppm Saturation in Air	5656(ss) 306207(DI)	☒

Check only

Redox (ORP) *	Electrode operability test	240mV +/- 10%	232 mV	316292 (A) 315895(B)	☒
---------------	----------------------------	---------------	--------	-------------------------	-------------------------------------

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

- ☒ Battery Status 8.27V (min 7.2V)
☒ Electrical Safety Tag attached (AS/NZS 3760)

- ☒ Temperature 19.8 °C
☒ Electrodes Cleaned and checked

Tag No: 000481

Valid to: 02/06/2018

Date: 22/05/2018

Signed: [Signature]

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

Sent	Returned	Item
☒	☐	90FLMV Unit. Ops check/Battery status: <u>8.27V</u>
☒	☐	pH sensor with wetting cap, 5m
☒	☐	Conductivity/TDS/Temperature K=10 sensor, 5m
☒	☐	Dissolved oxygen YSI5739 sensor with wetting cap, 5m
☒	☐	Redox (ORP) sensor with wetting cap, 5m
☒	☐	Power supply 240V to 12V DC 200mA
☒	☐	Instruction Manual
☒	☐	Quick Guide
☒	☐	Syringe with storage solution for pH and ORP sensors
☒	☐	Carry Case
☒	☐	Check to confirm electrical safety (tag must be valid)

Date: 22/05/2018

Signed: [Signature]

TFS Reference	<u>CS008915</u>	Return Date:	/ /
Customer Reference		Return Time:	
Equipment ID	<u>90FLMV - 80</u>	Condition on return:	
Equipment Serial No.	<u>T3692</u>		

"We do more than give you great equipment... We give you great solutions!"

Phone: (Free Call) 1300 735 295		Fax: (Free Call) 1800 675 123		Email: RentalsAU@ThermoFisher.com	
Melbourne Branch 5 Caribbean Drive, Scoresby 3179	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067	Brisbane Branch Unit 2/5 Ross St Newstead 4006	Perth Branch 121 Beringarra Ave Malga WA 6090	

RENTALS

Equipment Report – Solinst Model 122 Interface Meter

This Meter has been performance checked / calibrated* as follows:

Cleaned/Tested

Pass? ☒ Yes

☐ No

☒ Probe

☒ Tape/Reel

☒ Performance Test & Battery Voltage Check (8.6 v) 8.0v minimum

Date: 22/05/2018 Checked by: ABG/jil

Signed: [Signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum \$20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Received	Returned	Item
☒	☐	☐	Operations check OK
☒	☐	☐	Plastic Box / Bag
☒	☐	☐	Spare 9V Battery Qty <u>1</u>
☒	☐	☐	Probe Cleaning Brush
☐	☐	☐	Decon
☒	☐	☐	Instruction leaflet
☒	☐	☐	Tape Guide
☐	☐	☐	

Processors Signature/ Initials

[Signature]

Quote Reference	<u>C5008915</u>	Condition on return
Customer Ref		
Equipment ID	<u>SOL122-67</u>	
Equipment serial no.	<u>268062</u>	
Return Date	<u>/ /</u>	
Return Time		

"We do more than give you great equipment... We give you great solutions!"

Phone: (Free Call) 1300 735 295		Fax: (Free Call) 1800 675 123		Email: RentalsAU@Thermofisher.com	
Melbourne Branch 5 Caribbean Drive, Scoresby 3179	Sydney Branch Level 1, 4 Talavera Road, North Ryde 2113	Adelaide Branch 27 Beulah Road, Norwood, South Australia 5067	Brisbane Branch Unit 2/5 Ross St Newstead 4006	Perth Branch 121 Beringarra Ave. Majaga WA 6090	

Appendix E Previous Results

	Table B1 - Soil Analytical Results		Heavy metals (g)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	PAHs	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Total PAHs	
	NEPM Ecological Investigation Levels (EILs)			20	3	400	100	600	1	60	200																		
	NEPM HILs Column F for commercial/industrial landuse			500	100	600000	5000	1500	75	3000	35000												5				100		
	NSW EPA (1994) Service Station Guidelines							300															1					20	
	Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
Method detection limit (MDL)				4	0.4	1	1	1	0.1	1	1		0.1/ 1	0.1/ 1	0.1/ 1	0.1/ 1	0.5 / 1	0.1/ 1	0.1/ 1	0.1/ 1	0.1/ 1	0.1/ 1	0.1/ 1	0.2	0.05/1	0.1/ 1	0.1/ 1	0.1/ 1	
Sample Location	Sample Depth	Sample Description																											
BH01	0.1-0.2	Fill, dark brown silty sand		<4	0.4	16	93	120	<0.1	37	190		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND
BH01	0.6-0.7	Fill, brown clay																											
BH02	0.0-0.1	Fill, dark grey silty sand		<4	1.1	19	1100	700	0.2	36	470		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND
BH02	0.3-0.4	Fill, brown sandy clay																											
BH03	0.2-0.3	Fill, brown silty clay		<4	<0.4	8	71	2	<0.1	89	34																		
BH03	0.45-0.55	Fill, red crushed brick																											
BH04	0.0-0.1	Fill, brown sandy clay		<4	<0.4	16	85	13	<0.1	79	89		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND
BH04	0.3-0.4	Fill, brown sandy clay																											
BH05	0.1-0.2	Fill, brown gravelly silt		<4	<0.4	95	30	7	<0.1	92	54		0.2	<0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	0.5
BH05	0.3-0.4	Natural, light brown clay		<4	<0.4	9	6	10	<0.1	3	6																		
BH06	0.1-0.2	Fill, brown sandy clay		5	<0.4	15	51	44	<0.1	14	320		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND
BH06	0.6-0.7	Natural, light brown clay																											
BH06	1.1-1.2	Natural, light brown clay																											
BH07	0.1-0.2	Fill, brown/red gravelly clay		8	<0.4	17	32	31	<0.1	21	84		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	ND
BH07	0.7-0.8	Fill, brown/red gravelly clay																											
BH08	0.2-0.3	Fill, brown/grey silty sand		<4	<0.4	22	18	18	<0.1	17	87		<0.1	<0.1	<0.1	<0.1	0.5	<0.1	0.6	0.5	0.2	0.2	0.3	0.25	0.1	<0.1	0.1	2.65	
BH08	0.7-0.8	Fill, blue/brown coarse gravel		<4	<0.4	11	40	14	<0.1	23	180																		
BH09	0.0-0.1	Fill, brown/grey silty sand		<4	<0.4	19	71	32	<0.1	71	76		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	ND	
BH09	0.5-0.6	Fill, brown sandy clay		5	<0.4	26	24	53	0.2	28	71		<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.2	0.11	<0.1	<0.1	<0.1	0.61	
BH10	0.4-0.5	Fill, orange silty clay		9	<0.4	15	19	14	<0.1	5	25		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH10	1.1-1.2	Natural, orange sandy clay											<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	ND	
BH10	2.0-2.1	Natural, orange sandy clay		5	<0.4	11	15	8	<0.1	5	20		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH11	0.1-0.2	Fill, brown/grey silty sandy clay		7	0.5	17	52	95	0.1	14	280		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND
BH11	0.9-1.0	Natural, orange sandy clay											<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	ND	
BH12	0.5-0.6	Fill, brown/grey silty sandy clay		11	<0.4	21	47	35	<0.1	11	210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH12	1.5-16	Natural, grey clay		11	<0.4	16	21	14	<0.1	5	26		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH12	2.0-2.1	Natural, orange sandy clay																											
BH13	0.1-0.2	Fill, brown/grey silty sandy clay		9	<0.4	16	51	30	<0.1	23	170		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.2	0.07	<0.1	<0.1	<0.1	0.17	
BH13	1.0-1.1	Natural, grey/orange clay		14	<0.4	22	29	39	0.1	12	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	ND	
BH13	1.8-1.9	Natural, weathered shale		6	<0.4	4	12	9	<0.1	3	21																		
BH14	0.0-0.2	Fill, brown/orange silty sand		10	<0.4	16	20	17	<0.1	8	34		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH14	0.5-0.6	Natural, grey/orange clay		19	<0.4	28	23	33	<0.1	10	58		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH14	2.4-2.5	Natural, red clay											<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	ND	
BH15	0.0-0.1	Fill, grey coarse sand		<4	<0.4	7	82	5	<0.1	27	37		<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.2	0.3	<0.1	<0.1	<0.2	0.1	<0.1	<0.1	<0.1	0.8	
BH15	0.2-0.3	Fill, yellow sand		<4	<0.4	6	10	3	<0.1	5	13		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH15	1.5-1.6	Natural, grey/yellow clay		<4	<0.4	3	16	7	<0.1	4	35		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH17	0.4-0.5	Fill, brown/grey sandy clay		5	<0.4	7	28	14	<0.1	24	96		<1																
BH17	0.7-0.8	Fill, grey/red/brown clay		5	<0.4	5	19	13	<0.1	14	80		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH18	0.2-0.3	Fill, grey sandy clay		7	<0.4	15	19	16	<0.1	10	40		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH18	0.5-0.6	Natural, red/brown clay		<4	<0.4	4	13	9	<0.1	3	16		<1																
BH18	1.2-1.3	Natural, grey/red clay		5	<0.4	3	12	7	<0.1	7	43		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
BH20	0.0-0.1	Fill, brown silty sand		<4	<0.4	17	63	30	<0.1	59	130		<1																
BH20	0.3-0.4	Fill, brown/red sandy clay		7	<0.4	35	6	38	0.2	6	26		<1	<1	<1	<1	1	<1	2	1	<1	<1		<1	<1	<1	<1	4	
BH21	0.4-0.5	Fill, grey sandy clay		<4	<0.4	14	37	22	<0.1	11	130		<1																
BH21	1.0-1.1	Fill, grey sandy clay																											
SS1	0.0-0.1	Fill, dark brown sandy silt		<4	<0.4	14	130	64	<0.1	100	180		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
SS2	0.0-0.1	Fill, brown sandy silt																											
SS3	0.0-0.1	Fill, brown sandy clay		<4	0.8	15	99	27	<0.1	100	110		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
FD01	-			7	<0.4	22	38	96	<0.1	15	300		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	
FD02	-			11	<0.4	23	22	17	<0.1	9	34		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	ND	

	Table B1 - Soil Analytical Results		BTEX	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Total xylene	Total Petroleum Hydrocarbons	TRH C6 - C9	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	TRH >C10-C16	TRH >C16-C34	OCs	All OCPs	PCBs	All PCBs	OPPs	All OPPs	Monocyclic Aromatic Hydrocarbons	All MAHs	Halogenated Aliphatics Hydrocarbons	All HAH	SVOC/VOCs	All Other SVOC/VOCs	Asbestos
NEPM Ecological Investigation Levels (EILs)				1																									
NEPM HILs Column F for commercial/industrial landuse																													
NSW EPA (1994) Service Station Guidelines				1	130	50			25		65																		
Units				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg			mg/kg		mg/kg			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Y/N
Method detection limit (MDL)				0.2	0.5	1	2	1			25	50	100	100															
Sample Location	Sample Depth	Sample Description																											
BH01	0.1-0.2	Fill, dark brown silty sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	340	520	<50	740													N
BH01	0.6-0.7	Fill, brown clay									<25	<50	<100	<100	<50	<100													
BH02	0.0-0.1	Fill, dark grey silty sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	590	420	<50	1000												ND	
BH02	0.3-0.4	Fill, brown sandy clay									<25	<50	<100	<100	<50	<100													
BH03	0.2-0.3	Fill, brown silty clay															ND		ND		ND								
BH03	0.45-0.55	Fill, red crushed brick									<25	<50	<100	<100	<50	<100				ND									
BH04	0.0-0.1	Fill, brown sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	100							ND				ND	N	
BH04	0.3-0.4	Fill, brown sandy clay															ND												
BH05	0.1-0.2	Fill, brown gravelly silt		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100		ND		ND		ND							
BH05	0.3-0.4	Natural, light brown clay																											
BH06	0.1-0.2	Fill, brown sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH06	0.6-0.7	Natural, light brown clay									<25	<50	<100	<100	<50	<100													
BH06	1.1-1.2	Natural, light brown clay									<25	<50	<100	<100	<50	<100													
BH07	0.1-0.2	Fill, brown/red gravelly clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100												ND	
BH07	0.7-0.8	Fill, brown/red gravelly clay		<0.2	<0.5	<1	<2	<1	ND															ND		ND			
BH08	0.2-0.3	Fill, brown/grey silty sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH08	0.7-0.8	Fill, blue/brown coarse gravel									<25	<50	110	<100	<50	140													
BH09	0.0-0.1	Fill, brown/grey silty sand		<0.2	<0.5	<1	<2	<1	ND														ND		ND		ND		
BH09	0.5-0.6	Fill, brown sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH10	0.4-0.5	Fill, orange silty clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH10	1.1-1.2	Natural, orange sandy clay		<0.2	<0.5	<1	<2	<1	ND														ND		ND		ND		
BH10	2.0-2.1	Natural, orange sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH11	0.1-0.2	Fill, brown/grey silty sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	120	190	63	230													
BH11	0.9-1.0	Natural, orange sandy clay		<0.2	<0.5	<1	<2	<1	ND														ND		ND		ND		
BH12	0.5-0.6	Fill, brown/grey silty sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH12	1.5-16	Natural, grey clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH12	2.0-2.1	Natural, orange sandy clay									<25	<50	<100	<100	<50	<100													
BH13	0.1-0.2	Fill, brown/grey silty sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH13	1.0-1.1	Natural, grey/orange clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100							ND		ND		ND		
BH13	1.8-1.9	Natural, weathered shale									<25	<50	<100	<100	<50	<100													
BH14	0.0-0.2	Fill, brown/orange silty sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													N
BH14	0.5-0.6	Natural, grey/orange clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100	ND		ND		ND								
BH14	2.4-2.5	Natural, red clay		<0.2	<0.5	<1	<2	<1	ND														ND		ND		ND		
BH15	0.0-0.1	Fill, grey coarse sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	360	1200	<50	1100													
BH15	0.2-0.3	Fill, yellow sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH15	1.5-1.6	Natural, grey/yellow clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH17	0.4-0.5	Fill, brown/grey sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	140	250	<50	310													
BH17	0.7-0.8	Fill, grey/red/brown clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH18	0.2-0.3	Fill, grey sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH18	0.5-0.6	Natural, red/brown clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
BH18	1.2-1.3	Natural, grey/red clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100	ND		ND		ND								
BH20	0.0-0.1	Fill, brown silty sand		<0.2	<0.5	<1	<2	<1	ND		<25	<50	120	160	<50	220								ND					
BH20	0.3-0.4	Fill, brown/red sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100							ND		ND		ND		
BH21	0.4-0.5	Fill, grey sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	140	<50	210													
BH21	1.0-1.1	Fill, grey sandy clay									<25	280	3900	120	1100	3200													
SS1	0.0-0.1	Fill, dark brown sandy silt		<0.2	<0.5	<1	<2	<1	ND		<25	<50	<100	<100	<50	<100													
SS2	0.0-0.1	Fill, brown sandy silt									<25	<50	210	230	<50	410													
SS3	0.0-0.1	Fill, brown sandy clay		<0.2	<0.5	<1	<2	<1	ND		<25	<50	11000	4600	140	15000													
FD01	-			<0.2	<0.5	<1	<2	<1	ND		<25	<50	110																

Notes:

FD1 Duplicate Sample of ____

(a) Criteria for Chromium III

(b) Crieria for Inorganic Mercury

	Exceeds NEPM Ecological Investigation Levels (EILs)
	Exceeds NEPM HILs Column A for standard residential with garden/accessible landuse
	Exceeds NEPM HILs Column D for residential with minimal opportunities for soil access
	Exceeds NEPM HILs Column E for parks, recreational open space and playing fields
	Exceeds NEPM HILs Column F for commercial/industrial landuse
	Exceeds NSW EPA (1995) Sensitive landuse criteria

All units mg/kg except where shown

ND = Not detected above method detection limit

* Represents approximate value.

Water Results Compared to guidelines in ANZECC 2000

	Heavy Metals										PAHs	TPH						BTEX Compounds							
	Arsenic ³	Cadmium	Chromium ²	Copper	Dissolved Copper	Lead	Nickel	Zinc	Dissolved Zinc	Mercury ¹	Naphthalene	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₃₇ -C ₄₀	Total C ₁₀ -C ₃₆	Benzene	Toluene	Ethyl benzene	m/p-xylene	o-xylene	Total Xylenes	Total BTEX	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
PQL - SGS Sydney	1	0.1	1	1	1	1	1	5	5	0.0001	0.5	40	50	200	200	200	450	0.5	0.5	0.5	1	0.5	1.5	3	
Trigger values for freshwater (µg/L-1) 95% species protection	13	0.2	0.01	1.4	1.4	3.4	11	8	8	0.6	16							950				350	ID		200

Sample Number	Sample Results																							
473/E/W1	<1	<0.1	<1	3	3	1	2	170	190	<0.0001	<0.5	<40	<50	<200	<200	<200	<450	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3
473/NW/W1	<1	<0.1	<1	2	3	2	1	90	180	<0.0001	<0.5	<40	<50	<200	<200	<200	<450	<0.5	<0.5	<0.5	<1	<0.5	<1.5	<3

NOTES:

- 1 - Trigger value for Mercury (inorganic) has been used
- 2 - A 99% level of protection has been used for Chromium. The trigger value for Chromium (CrVI) has been used
- 3 - The trigger value for Arsenic (AsV) has been used

GUIDELINES:

Result above the trigger value

VALUE

ABBREVIATIONS

PAHs: Polycyclic aromatic hydrocarbons

B(a)P: Benzo(a)pyrene

PQL: Practical quantitation limit

LPQL: less than PQL

TPH: Total petroleum hydrocarbons

NL: No guideline level

Appendix F Laboratory Analytical Reports

CERTIFICATE OF ANALYSIS

Work Order : **ES1814629**
Client : **SULLIVAN ENVIRONMENTAL SCIENCES**
Contact : ADAM SULLIVAN
Address : PO Box 5248
 TURRAMURRA NSW 2074
Telephone : ----
Project : SES_483
Order number :
C-O-C number : ----
Sampler : A. Sullivan
Site : ----
Quote number : EN/222/17
No. of samples received : 32
No. of samples analysed : 21

Page : 1 of 16
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 : 21-May-2018 15:15
Date Analysis Commenced : 23-May-2018
Issue Date : 28-May-2018 17:55



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
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	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.

- 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	SB1_0.2-0.4	SB2_0-0.1	SB2_0.9-1.0	QC1	SB3_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-001	ES1814629-003	ES1814629-005	ES1814629-006	ES1814629-007
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		12.3	5.6	14.2	14.0	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos (Trace)	1332-21-4	5	Fibres		----	----	----	----	No
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	----	----	No
Asbestos Type	1332-21-4	-	--		----	----	----	----	-
Sample weight (dry)	----	0.01	g		----	----	----	----	68.2
APPROVED IDENTIFIER:	----	-	--		----	----	----	----	G.MORGAN
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		10	10	8	9	----
Copper	7440-50-8	5	mg/kg		47	52	9	9	----
Lead	7439-92-1	5	mg/kg		8	18	<5	<5	----
Nickel	7440-02-0	2	mg/kg		48	91	2	2	----
Zinc	7440-66-6	5	mg/kg		58	77	6	<5	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Pyrene	129-00-0	0.5	mg/kg		<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	----
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	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1_0.2-0.4	SB2_0-0.1	SB2_0.9-1.0	QC1	SB3_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-001	ES1814629-003	ES1814629-005	ES1814629-006	ES1814629-007
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	<0.5	<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	----
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	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		77.6	71.7	68.0	70.3	----
2-Chlorophenol-D4	93951-73-6	0.5	%		76.0	72.9	67.7	69.9	----
2,4,6-Tribromophenol	118-79-6	0.5	%		62.9	61.5	62.1	63.6	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB1_0.2-0.4	SB2_0-0.1	SB2_0.9-1.0	QC1	SB3_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-001	ES1814629-003	ES1814629-005	ES1814629-006	ES1814629-007
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		73.8	74.9	71.2	73.5	----
Anthracene-d10	1719-06-8	0.5	%		75.2	79.0	75.0	76.1	----
4-Terphenyl-d14	1718-51-0	0.5	%		82.9	87.2	85.0	86.7	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		96.8	92.6	94.2	118	----
Toluene-D8	2037-26-5	0.2	%		93.2	102	91.3	120	----
4-Bromofluorobenzene	460-00-4	0.2	%		84.5	92.8	82.2	107	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB3_1.0-1.2	SB4_0-0.1	SB4_0.4-0.5	SB5_0-0.1	QC2
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-008	ES1814629-009	ES1814629-010	ES1814629-012	ES1814629-013
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		16.4	7.3	15.4	6.2	6.2
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos (Trace)	1332-21-4	5	Fibres		----	No	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	No	----	----	----
Asbestos Type	1332-21-4	-	--		----	-	----	----	----
Sample weight (dry)	----	0.01	g		----	53.7	----	----	----
APPROVED IDENTIFIER:	----	-	--		----	G.MORGAN	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		15	12	21	11	12
Copper	7440-50-8	5	mg/kg		16	69	95	40	47
Lead	7439-92-1	5	mg/kg		9	26	5	54	25
Nickel	7440-02-0	2	mg/kg		9	78	25	59	58
Zinc	7440-66-6	5	mg/kg		51	124	52	101	144
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB3_1.0-1.2	SB4_0-0.1	SB4_0.4-0.5	SB5_0-0.1	QC2
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-008	ES1814629-009	ES1814629-010	ES1814629-012	ES1814629-013
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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		110	<100	470	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		110	<50	470	<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	500	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		120	<50	550	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		73.4	70.8	76.6	75.9	73.8
2-Chlorophenol-D4	93951-73-6	0.5	%		66.8	71.4	79.2	77.3	67.0
2,4,6-Tribromophenol	118-79-6	0.5	%		43.8	57.2	25.4	51.6	54.4



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID

				SB3_1.0-1.2	SB4_0-0.1	SB4_0.4-0.5	SB5_0-0.1	QC2
Client sampling date / time				17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00	17-May-2018 00:00
Compound	CAS Number	LOR	Unit	ES1814629-008	ES1814629-009	ES1814629-010	ES1814629-012	ES1814629-013
				Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	70.3	74.1	71.3	70.0	70.4
Anthracene-d10	1719-06-8	0.5	%	74.1	75.6	74.2	74.5	73.1
4-Terphenyl-d14	1718-51-0	0.5	%	83.5	87.4	84.3	81.5	82.6
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	102	108	85.8	97.3	98.0
Toluene-D8	2037-26-5	0.2	%	103	108	91.4	102	95.9
4-Bromofluorobenzene	460-00-4	0.2	%	91.4	95.8	83.0	88.8	85.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB6_0-0.1	SB6_1.9-2.0	SB7_0.4-0.5	SB8_0-0.1	SB9_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-016	ES1814629-017	ES1814629-018	ES1814629-020	ES1814629-024
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.5	14.0	13.2	6.3	8.6
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos (Trace)	1332-21-4	5	Fibres		----	----	----	----	No
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		----	----	----	----	No
Asbestos Type	1332-21-4	-	--		----	----	----	----	-
Sample weight (dry)	----	0.01	g		----	----	----	----	49.6
APPROVED IDENTIFIER:	----	-	--		----	----	----	----	G.MORGAN
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		10	8	2	9	11
Copper	7440-50-8	5	mg/kg		43	17	16	48	63
Lead	7439-92-1	5	mg/kg		14	<5	<5	17	15
Nickel	7440-02-0	2	mg/kg		63	13	17	90	90
Zinc	7440-66-6	5	mg/kg		76	27	61	70	154
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB6_0-0.1	SB6_1.9-2.0	SB7_0.4-0.5	SB8_0-0.1	SB9_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-016	ES1814629-017	ES1814629-018	ES1814629-020	ES1814629-024
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	180	1580
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	820
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	180	2400
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	210	2260
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	230
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	210	2490
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		75.1	75.6	72.6	72.5	75.8
2-Chlorophenol-D4	93951-73-6	0.5	%		69.0	75.2	73.3	72.7	69.0
2,4,6-Tribromophenol	118-79-6	0.5	%		59.1	57.7	65.0	52.0	65.8



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB6_0-0.1	SB6_1.9-2.0	SB7_0.4-0.5	SB8_0-0.1	SB9_0-0.1
Client sampling date / time					17-May-2018 00:00	17-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-016	ES1814629-017	ES1814629-018	ES1814629-020	ES1814629-024
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		72.5	73.4	74.9	75.7	70.4
Anthracene-d10	1719-06-8	0.5	%		76.6	77.3	79.4	80.0	76.8
4-Terphenyl-d14	1718-51-0	0.5	%		85.0	88.5	90.9	89.8	83.9
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		91.8	85.4	92.1	101	107
Toluene-D8	2037-26-5	0.2	%		91.8	94.6	86.0	94.3	102
4-Bromofluorobenzene	460-00-4	0.2	%		83.8	80.8	79.0	85.2	91.8



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_0-0.1	SB11_0-0.1	SB12_0-0.1	SB12_0.3-0.4	SS4
Client sampling date / time					18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-025	ES1814629-027	ES1814629-029	ES1814629-030	ES1814629-031
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		5.1	8.8	----	7.1	2.2
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	----	----
Asbestos Type	1332-21-4	-	--		-	-	-	----	----
Sample weight (dry)	----	0.01	g		80.3	57.1	76.0	----	----
APPROVED IDENTIFIER:	----	-	--		G.MORGAN	G.MORGAN	G.MORGAN	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	----	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	<1	<1
Chromium	7440-47-3	2	mg/kg		11	25	----	12	10
Copper	7440-50-8	5	mg/kg		52	9	----	<5	637
Lead	7439-92-1	5	mg/kg		23	<5	----	5	71
Nickel	7440-02-0	2	mg/kg		86	23	----	2	66
Zinc	7440-66-6	5	mg/kg		140	21	----	<5	617
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	----	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<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
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



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_0-0.1	SB11_0-0.1	SB12_0-0.1	SB12_0.3-0.4	SS4
Client sampling date / time					18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-025	ES1814629-027	ES1814629-029	ES1814629-030	ES1814629-031
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
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	<0.5	----	<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	170
C15 - C28 Fraction	----	100	mg/kg		12600	110	----	<100	45100
C29 - C36 Fraction	----	100	mg/kg		4090	<100	----	<100	15100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		16700	110	----	<50	60400
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		150	<50	----	<50	560
>C16 - C34 Fraction	----	100	mg/kg		16000	140	----	<100	57800
>C34 - C40 Fraction	----	100	mg/kg		1090	<100	----	<100	4120
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		17200	140	----	<50	62500
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		150	<50	----	<50	560
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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		68.8	75.8	----	70.6	68.2
2-Chlorophenol-D4	93951-73-6	0.5	%		70.1	76.9	----	71.2	69.7
2,4,6-Tribromophenol	118-79-6	0.5	%		67.8	57.6	----	59.4	71.8



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_0-0.1	SB11_0-0.1	SB12_0-0.1	SB12_0.3-0.4	SS4
Client sampling date / time					18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00	18-May-2018 00:00
Compound	CAS Number	LOR	Unit		ES1814629-025	ES1814629-027	ES1814629-029	ES1814629-030	ES1814629-031
					Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		72.2	73.8	----	74.6	69.3
Anthracene-d10	1719-06-8	0.5	%		71.7	77.7	----	77.7	71.2
4-Terphenyl-d14	1718-51-0	0.5	%		92.8	87.7	----	89.2	84.2
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		90.6	94.9	----	105	104
Toluene-D8	2037-26-5	0.2	%		102	89.3	----	99.7	94.1
4-Bromofluorobenzene	460-00-4	0.2	%		92.3	80.3	----	91.4	88.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TB	----	----	----	----
Client sampling date / time				02-May-2018 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1814629-032	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	89.8	----	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	93.7	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	83.3	----	----	----	----	----

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	SB3_0-0.1 - 17-May-2018 00:00	Mid brown sandy soil.
EA200: Description	SB4_0-0.1 - 17-May-2018 00:00	Mid brown sandy soil.
EA200: Description	SB9_0-0.1 - 18-May-2018 00:00	Mid brown sandy soil.
EA200: Description	SB10_0-0.1 - 18-May-2018 00:00	Mid brown sandy soil.
EA200: Description	SB11_0-0.1 - 18-May-2018 00:00	Mid brown sandy soil.
EA200: Description	SB12_0-0.1 - 18-May-2018 00:00	Mid brown sandy soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
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

QUALITY CONTROL REPORT

Work Order	: ES1814629	Page	: 1 of 7
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	: Customer Services ES
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 21-May-2018
Order number	: ----	Date Analysis Commenced	: 23-May-2018
C-O-C number	: ----	Issue Date	: 28-May-2018
Sampler	: A. Sullivan		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 32		
No. of samples analysed	: 21		



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
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	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: **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: 1672001)									
ES1814629-005	SB2_0.9-1.0	EA055: Moisture Content	----	0.1	%	14.2	13.5	5.18	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1672002)									
ES1814629-018	SB7_0.4-0.5	EA055: Moisture Content	----	0.1	%	13.2	15.1	13.3	0% - 50%
ES1814635-005	Anonymous	EA055: Moisture Content	----	0.1	%	6.8	6.7	0.00	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 1673826)									
ES1814625-056	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	12	10	14.8	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	12	11	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	25	22	15.3	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	42	38	10.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	85	78	8.77	0% - 50%
ES1814629-016	SB6_0-0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	63	57	10.1	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	43	38	12.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	12	21.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	76	64	16.3	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1673827)									
ES1814625-056	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1814629-016	SB6_0-0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1663483)									
ES1814629-001	SB1_0.2-0.4	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1663484)



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: 1663484) - continued									
ES1814629-001	SB1_0.2-0.4	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
ES1814629-017	SB6_1.9-2.0	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: 1668010)									
ES1814629-001	SB1_0.2-0.4	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1814629-017	SB6_1.9-2.0	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1663484)									
ES1814629-001	SB1_0.2-0.4	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
ES1814629-017	SB6_1.9-2.0	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: 1668010)									
ES1814629-001	SB1_0.2-0.4	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1814629-017	SB6_1.9-2.0	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1668010)									
ES1814629-001	SB1_0.2-0.4	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
ES1814629-017	SB6_1.9-2.0	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		

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 (%)	Recovery Limits (%)		
		LCS	Low	High	
Result					
<5	21.7 mg/kg	96.1	86	126	
<1	4.64 mg/kg	95.5	83	113	
<2	43.9 mg/kg	76.8	76	128	
<5	32 mg/kg	101	86	120	
<5	40 mg/kg	85.0	80	114	
<2	55 mg/kg	89.1	87	123	
<5	60.8 mg/kg	105	80	122	
<0.1	2.57 mg/kg	76.2	70	105	
<0.5	6 mg/kg	89.8	77	125	
<0.5	6 mg/kg	86.9	72	124	
<0.5	6 mg/kg	83.3	73	127	
<0.5	6 mg/kg	86.7	72	126	
<0.5	6 mg/kg	88.3	75	127	
<0.5	6 mg/kg	89.3	77	127	
<0.5	6 mg/kg	85.6	73	127	
<0.5	6 mg/kg	85.3	74	128	
<0.5	6 mg/kg	82.6	69	123	
<0.5	6 mg/kg	88.3	75	127	
<0.5	6 mg/kg	70.4	68	116	
<0.5	6 mg/kg	75.8	74	126	
<0.5	6 mg/kg	81.9	70	126	
<0.5	6 mg/kg	66.6	61	121	
<0.5	6 mg/kg	70.2	62	118	
<0.5	6 mg/kg	67.8	63	121	
<50	200 mg/kg	102	75	129	
<100	300 mg/kg	103	77	131	
<100	200 mg/kg	105	71	129	
<10	26 mg/kg	79.4	68	128	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: <i>Compound</i>	CAS Number	LOR	Unit	Result				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1663484) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	105	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	103	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	98.3	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1668010)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	83.5	68	128
EP080: BTEXN (QCLot: 1668010)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	85.1	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	87.4	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	86.3	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	85.8	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	87.5	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	88.2	63	119

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				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: 1673826)							
ES1814625-056	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	115	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	126	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	121	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	122	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	130	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	126	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1673827)							
ES1814625-056	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	74.6	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1663483)							
ES1814629-001	SB1_0.2-0.4	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	84.9	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	89.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1663484)							
ES1814629-001	SB1_0.2-0.4	EP071: C10 - C14 Fraction	----	523 mg/kg	87.1	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	103	53	131



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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1663484) - continued							
ES1814629-001	SB1_0.2-0.4	EP071: C29 - C36 Fraction	----	1714 mg/kg	106	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1668010)							
ES1814629-001	SB1_0.2-0.4	EP080: C6 - C9 Fraction	----	32.5 mg/kg	73.3	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1663484)							
ES1814629-001	SB1_0.2-0.4	EP071: >C10 - C16 Fraction	----	860 mg/kg	82.3	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	101	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	92.9	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1668010)							
ES1814629-001	SB1_0.2-0.4	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	76.6	70	130
EP080: BTEXN (QCLot: 1668010)							
ES1814629-001	SB1_0.2-0.4	EP080: Benzene	71-43-2	2.5 mg/kg	76.5	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	77.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	76.1	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	71.2	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	77.1	70	130
		EP080: Napthalene	91-20-3	2.5 mg/kg	77.0	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1814629	Page	: 1 of 8
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 21-May-2018
Site	: ----	Issue Date	: 28-May-2018
Sampler	: A. Sullivan	No. of samples received	: 32
Order number	:	No. of samples analysed	: 21

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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



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	ES1814629-010	SB4_0.4-0.5	2.4.6-Tribromophenol	118-79-6	25.4 %	40-138 %	Recovery less than lower data quality objective
EP075(SIM)T: PAH Surrogates	ES1814629-031	SS4	2-Fluorobiphenyl	321-60-8	69.3 %	70-122 %	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Petroleum Hydrocarbons						
Soil Glass Jar - Unpreserved TB	23-May-2018	16-May-2018	7	25-May-2018	16-May-2018	9
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Soil Glass Jar - Unpreserved TB	23-May-2018	16-May-2018	7	25-May-2018	16-May-2018	9
EP080: BTEXN						
Soil Glass Jar - Unpreserved TB	23-May-2018	16-May-2018	7	25-May-2018	16-May-2018	9

Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Moisture Content	3	36	8.33	10.00	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 Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



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)		17-May-2018	----	----	----	24-May-2018	31-May-2018	✓
SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0	SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,							
Soil Glass Jar - Unpreserved (EA055)		18-May-2018	----	----	----	24-May-2018	01-Jun-2018	✓
SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4	SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,							
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Snap Lock Bag: Separate bag received (EA200)		17-May-2018	----	----	----	23-May-2018	13-Nov-2018	✓
SB3_0-0.1,	SB4_0-0.1							
Snap Lock Bag: Separate bag received (EA200)		18-May-2018	----	----	----	23-May-2018	14-Nov-2018	✓
SB9_0-0.1, SB11_0-0.1,	SB10_0-0.1, SB12_0-0.1							
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag: Separate bag received (EA200)		17-May-2018	----	----	----	23-May-2018	13-Nov-2018	✓
SB3_0-0.1,	SB4_0-0.1							
Snap Lock Bag: Separate bag received (EA200)		18-May-2018	----	----	----	23-May-2018	14-Nov-2018	✓
SB9_0-0.1, SB11_0-0.1,	SB10_0-0.1, SB12_0-0.1							
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)		17-May-2018	24-May-2018	13-Nov-2018	✓	24-May-2018	13-Nov-2018	✓
SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0	SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,							
Soil Glass Jar - Unpreserved (EG005T)		18-May-2018	24-May-2018	14-Nov-2018	✓	24-May-2018	14-Nov-2018	✓
SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4	SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,							

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

Method		Sample Date	Extraction / Preparation			Evaluation	Holding time breach		Within holding time
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)		17-May-2018	24-May-2018	14-Jun-2018	✓		25-May-2018	14-Jun-2018	✓
SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0	SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,								
Soil Glass Jar - Unpreserved (EG035T)		18-May-2018	24-May-2018	15-Jun-2018	✓		25-May-2018	15-Jun-2018	✓
SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4	SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Soil Glass Jar - Unpreserved (EP075(SIM))		17-May-2018	24-May-2018	31-May-2018	✓		26-May-2018	03-Jul-2018	✓
SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0	SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,								
Soil Glass Jar - Unpreserved (EP075(SIM))		18-May-2018	24-May-2018	01-Jun-2018	✓		26-May-2018	03-Jul-2018	✓
SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4	SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,								

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) TB		02-May-2018	23-May-2018	16-May-2018	✗	25-May-2018	16-May-2018	✗
Soil Glass Jar - Unpreserved (EP080) SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0 SB2_0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1		17-May-2018	23-May-2018	31-May-2018	✓	25-May-2018	31-May-2018	✓
Soil Glass Jar - Unpreserved (EP071) SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0 SB2_0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1		17-May-2018	24-May-2018	31-May-2018	✓	25-May-2018	03-Jul-2018	✓
Soil Glass Jar - Unpreserved (EP080) SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4 SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4		18-May-2018	23-May-2018	01-Jun-2018	✓	25-May-2018	01-Jun-2018	✓
Soil Glass Jar - Unpreserved (EP071) SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4 SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4		18-May-2018	24-May-2018	01-Jun-2018	✓	25-May-2018	03-Jul-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) TB		02-May-2018	23-May-2018	16-May-2018	✖	25-May-2018	16-May-2018	✖
Soil Glass Jar - Unpreserved (EP080) SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0		17-May-2018	23-May-2018	31-May-2018	✔	25-May-2018	31-May-2018	✔
SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,								
Soil Glass Jar - Unpreserved (EP071) SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0		17-May-2018	24-May-2018	31-May-2018	✔	25-May-2018	03-Jul-2018	✔
SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,								
Soil Glass Jar - Unpreserved (EP080) SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4		18-May-2018	23-May-2018	01-Jun-2018	✔	25-May-2018	01-Jun-2018	✔
SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,								
Soil Glass Jar - Unpreserved (EP071) SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4		18-May-2018	24-May-2018	01-Jun-2018	✔	25-May-2018	03-Jul-2018	✔
SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,								
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) TB		02-May-2018	23-May-2018	16-May-2018	✖	25-May-2018	16-May-2018	✖
Soil Glass Jar - Unpreserved (EP080) SB1_0.2-0.4, SB2_0.9-1.0, SB3_1.0-1.2, SB4_0.4-0.5, QC2, SB6_1.9-2.0		17-May-2018	23-May-2018	31-May-2018	✔	25-May-2018	31-May-2018	✔
SB2_0-0.1, QC1, SB4_0-0.1, SB5_0-0.1, SB6_0-0.1,								
Soil Glass Jar - Unpreserved (EP080) SB7_0.4-0.5, SB9_0-0.1, SB11_0-0.1, SS4		18-May-2018	23-May-2018	01-Jun-2018	✔	25-May-2018	01-Jun-2018	✔
SB8_0-0.1, SB10_0-0.1, SB12_0.3-0.4,								



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	3	36	8.33	10.00	✖	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	18	11.11	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	2	18	11.11	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	18	5.56	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	18	5.56	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	18	5.56	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	18	5.56	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	18	5.56	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	18	5.56	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)
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.
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, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES1814629

Client : SULLIVAN ENVIRONMENTAL SCIENCES Contact : ADAM SULLIVAN Address : PO Box 5248 TURRAMURRA NSW 2074 E-mail : adam@sullivan-es.com.au Telephone : ---- Facsimile : ---- Project : SES_483 Order number : ---- C-O-C number : ---- Site : ---- Sampler : A. Sullivan	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 : ES2015SULENV0034 (EN/222/17) QC Level : NEPM 2013 B3 & ALS QC Standard
---	---

Dates

Date Samples Received : 21-May-2018 15:15 Client Requested Due Date : 28-May-2018	Issue Date : 22-May-2018 Scheduled Reporting Date : 28-May-2018
---	--

Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 1 Receipt Detail :	Security Seal : Intact. Temperature : 2.8 - Ice present No. of samples received / analysed : 32 / 21
--	--

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-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1814629-001	17-May-2018 00:00	SB1_0.2-0.4		✓			✓
ES1814629-002	17-May-2018 00:00	SB1_0.5-0.6	✓				
ES1814629-003	17-May-2018 00:00	SB2_0-0.1		✓			✓
ES1814629-004	17-May-2018 00:00	SB2_0.4-0.5	✓				
ES1814629-005	17-May-2018 00:00	SB2_0.9-1.0		✓			✓
ES1814629-006	17-May-2018 00:00	QC1		✓			✓
ES1814629-007	17-May-2018 00:00	SB3_0-0.1			✓		
ES1814629-008	17-May-2018 00:00	SB3_1.0-1.2		✓			✓
ES1814629-009	17-May-2018 00:00	SB4_0-0.1		✓	✓		✓
ES1814629-010	17-May-2018 00:00	SB4_0.4-0.5		✓			✓
ES1814629-011	17-May-2018 00:00	SB4_1.8-2.0	✓				
ES1814629-012	17-May-2018 00:00	SB5_0-0.1		✓			✓
ES1814629-013	17-May-2018 00:00	QC2		✓			✓
ES1814629-014	17-May-2018 00:00	SB5_0.6-0.7	✓				
ES1814629-015	17-May-2018 00:00	SB5_1.9-2.0	✓				
ES1814629-016	17-May-2018 00:00	SB6_0-0.1		✓			✓
ES1814629-017	17-May-2018 00:00	SB6_1.9-2.0		✓			✓
ES1814629-018	18-May-2018 00:00	SB7_0.4-0.5		✓			✓
ES1814629-019	18-May-2018 00:00	SB7_0.9-1.0	✓				
ES1814629-020	18-May-2018 00:00	SB8_0-0.1		✓			✓
ES1814629-021	18-May-2018 00:00	SB8_0.4-0.5	✓				
ES1814629-022	18-May-2018 00:00	QC3	✓				
ES1814629-023	18-May-2018 00:00	SB8_1.9-2.0	✓				
ES1814629-024	18-May-2018 00:00	SB9_0-0.1		✓	✓		✓
ES1814629-025	18-May-2018 00:00	SB10_0-0.1		✓	✓		✓
ES1814629-026	18-May-2018 00:00	SB10_0.3-0.4	✓				
ES1814629-027	18-May-2018 00:00	SB11_0-0.1		✓	✓		✓
ES1814629-028	18-May-2018 00:00	SB11_0.9-1.0	✓				
ES1814629-029	18-May-2018 00:00	SB12_0-0.1			✓		
ES1814629-030	18-May-2018 00:00	SB12_0.3-0.4		✓			✓
ES1814629-031	18-May-2018 00:00	SS4		✓			✓
ES1814629-032	02-May-2018 00:00	TB				✓	

Issue Date : 22-May-2018
 Page : 3 of 3
 Work Order : ES1814629 Amendment 0
 Client : SULLIVAN ENVIRONMENTAL SCIENCES



The following table summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory.

Matrix: **SOIL**

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

Method Client Sample ID(s)	Container	Due for extraction	Due for analysis	Samples Received		Instructions Received	
				Date	Evaluation	Date	Evaluation
EP080: TRH Volatiles/BTEX							
TB	Soil Glass Jar - Unpreserved	16-May-2018	16-May-2018	21-May-2018	✖	----	----

Requested Deliverables

ADAM SULLIVAN

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

Subcon / Forward Lab / Syllney
 Lab / Analysis: Asbestos - Newcastle
 Organised by / Date:
 Requisitioned by / Date:
 Container / Location:

CHAIN OF CUSTODY FORM

Sheet 1 of 3

THIS COLUMN FOR LAB USE ONLY		FROM: Sullivan Environmental Sciences PO Box 5248 Turramurra NSW 2074 Ph: 0400 500 264 Project No: SES_483 Project Manager: A. Sullivan Agreement No: EN/222/17 Released by: <i>A. Sullivan</i> Date: 21/5/18 Time: 2pm Received by: <i>304888</i> 286 Date: 21/5/18 Time: 1515		TO: ALS Environmental Smithfield		DATE: 21/5/18	
Job Code:		PO Box 5248 Turramurra NSW 2074 Ph: 0400 500 264 Project No: SES_483 Project Manager: A. Sullivan Agreement No: EN/222/17 Released by: A. Sullivan Date: 21/5/18 Time: 2pm		Received by: 304888 286 Date: 21/5/18 Time: 1515		DATE: 21/5/18	
Due Date:		Sample(s): A. Sullivan Signature(s): <i>A. Sullivan</i> Checked:		Container Size, Type, Preservative Attaching PO / Internal Storage and Analysis		Container Identification	
Custody seal intact? ☒ YES ☐ NO Sample cold? ☒ YES ☐ NO		Lab identification		Size Type* Preservative Code Analytes		Container Identification	
Lab identification		Date Time Matrix Sample Number		Total no Tick required analytes		Size Type* Preservative Code Analytes	
1 17/5 Solid SB1 0.2-0.4		+ Bag		2 X		S-26	
2 17/5 Solid SB1 0.5-0.6		+ Bag		1 X		Asbestos ID in soil	
3 17/5 Solid SB2 0-0.1		+ Bag		1 X		GTFXN	
4 17/5 Solid SB2 0.4-0.5		+ Bag		1 X		Asbestos ID in soil	
5 17/5 Solid SB2 0.9-1.0		+ Bag		1 X		GTFXN	
6 17/5 Solid QC1		+ Bag		2 X		Asbestos ID in soil	
7 17/5 Solid SB3 0-0.1		+ Bag		1 X		GTFXN	
8 17/5 Solid SB3 1.0-1.2		+ Bag		2 X		Asbestos ID in soil	
9 17/5 Solid SB4 0-0.1		+ Bag		1 X		GTFXN	
10 17/5 Solid SB4 0.4-0.5		+ Bag		2 X		Asbestos ID in soil	
11 17/5 Solid SB4 1.8-2.0		+ Bag		1 X		GTFXN	
12 17/5 Solid SB5 0-0.1		+ Bag		1 X		Asbestos ID in soil	
Remarks:		TOTAL		15 8 2 0 3		3	
Courier Job No:		Specify Turnaround Time:		NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES		Environmental Division Syllney Work Order Reference ES1814629	



Telephone : + 61-2-8794 8555

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

CHAIN OF CUSTODY FORM

Sheet 2 of 3

THIS COLUMN FOR LAB USE ONLY		FROM: Sullivan Environmental Sciences PO Box 5248 Turramurra NSW 2074 Ph: 0400 500 264 Email: adam@sullivan-es.com.au		DATE: 21/5/18 TO: ALS Environmental Smithfield		Container Size, Type, Preservative and Analysis	
Job Code:		Project No: SES_483 Project Manager: A. Sullivan		Sampler(s): [Signature]		Container Identification	
Due Date:		Agreement No: EN/222/17 Released by: [Signature]		Signature(s): [Signature]		Size Type* Preservative Code	
Custody seal intact? YES ☒ NO ☐		Date: 21/5/18 Time: 2pm		Date: 21/5/18 Time: 1515		Analytes	
Sample cold? YES ☒ NO ☐		Date: 21/5/18 Time: 2pm		Date: 21/5/18 Time: 1515		S-26 Asbestos ID BIFXN HOD	
Lab identification		Date		Matrix		Sample Number	
13		17/5		Solid		QC2	
14		17/5		Solid		SB5-0.6-0.7	
15		17/5		Solid		SB5-1.9-2.0	
16		17/5		Solid		SB6-0-0-1	
17		17/5		Solid		SB6-1.9-2.0	
18		18/5		Solid		SB7-0.4-0.5	
19		18/5		Solid		SB7-0.9-1.0	
20		18/5		Solid		SB8-0-0-1	
21		18/5		Solid		SB8-0.4-0.5	
22		18/5		Solid		QC3	
23		18/5		Solid		SB8-1.9-2.0	
24		18/5		Solid		SB9-0-0-1	
Remarks:		+ Bug		TOTAL		13 6 1 0 6	
Courier Job No:		NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES					

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

CERTIFICATE OF ANALYSIS

Work Order : **ES1815327**
Client : **SULLIVAN ENVIRONMENTAL SCIENCES**
Contact : ADAM SULLIVAN
Address : PO Box 5248
 TURRAMURRA NSW 2074
Telephone : ----
Project : SES_483
Order number : ----
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EN/222/17
No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 5
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 : 25-May-2018 14:00
Date Analysis Commenced : 28-May-2018
Issue Date : 01-Jun-2018 15:25



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>
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	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.

- 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

				MW01	MW02	MW03	Q01	----
Client sampling date / time				23-May-2018 00:00	23-May-2018 00:00	23-May-2018 00:00	23-May-2018 00:00	----
Compound	CAS Number	LOR	Unit	ES1815327-001	ES1815327-002	ES1815327-003	ES1815327-004	-----
				Result	Result	Result	Result	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.007	<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	<0.001	<0.001	<0.001	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L	0.006	0.002	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
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	----
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	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<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	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	Q01	----
Client sampling date / time					23-May-2018 00:00	23-May-2018 00:00	23-May-2018 00:00	23-May-2018 00:00	----
Compound	CAS Number	LOR	Unit		ES1815327-001	ES1815327-002	ES1815327-003	ES1815327-004	-----
					Result	Result	Result	Result	----
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	<20	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<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	<2	----
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		22.9	20.8	26.4	29.8	----
2-Chlorophenol-D4	93951-73-6	1.0	%		51.1	46.0	54.4	65.2	----
2,4,6-Tribromophenol	118-79-6	1.0	%		73.4	66.0	73.3	89.5	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		60.3	50.3	62.0	71.8	----
Anthracene-d10	1719-06-8	1.0	%		61.1	54.6	60.9	75.4	----
4-Terphenyl-d14	1718-51-0	1.0	%		61.1	60.3	66.2	78.6	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		96.3	92.6	101	98.8	----
Toluene-D8	2037-26-5	2	%		118	104	115	114	----
4-Bromofluorobenzene	460-00-4	2	%		106	96.9	106	104	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
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	: ES1815327	Page	: 1 of 7
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	: Customer Services ES
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 25-May-2018
Order number	: ----	Date Analysis Commenced	: 28-May-2018
C-O-C number	: ----	Issue Date	: 01-Jun-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
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 Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	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 (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1686510)									
ES1815278-008	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	<0.005	<0.005	0.00	No Limit
ES1815332-005	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	0.008	0.008	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	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1686506)									
ES1815030-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1815278-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1680874)									
ES1815285-001	Anonymous	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	1.2	15.9	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 (%)		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1680874) - continued											
ES1815285-001	Anonymous	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	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit		
		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		
ES1815285-004	Anonymous	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	1.1	11.6	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	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	0.00	No Limit		
		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: 1680875)									
		ES1815285-001	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	11700	11000	6.18	0% - 20%
EP071: C10 - C14 Fraction	----			50	µg/L	1040	1060	1.87	0% - 20%		
EP071: C29 - C36 Fraction	----			50	µg/L	150	140	6.76	No Limit		
ES1815285-004	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	12200	12600	3.77	0% - 20%		
		EP071: C10 - C14 Fraction	----	50	µg/L	940	1030	8.91	0% - 20%		
		EP071: C29 - C36 Fraction	----	50	µg/L	330	340	4.84	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1686924)											
ES1814998-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit		
ES1815327-001	MW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1680875)											
ES1815285-001	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	1440	1420	1.02	0% - 50%		



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 (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1680875) - continued									
ES1815285-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	µg/L	11000	11400	3.23	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	<100	0.00	No Limit
ES1815285-004	Anonymous	EP071: >C10 - C16 Fraction	----	100	µg/L	770	830	8.20	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	12000	13000	7.46	0% - 20%
		EP071: >C34 - C40 Fraction	----	100	µg/L	310	360	15.2	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1686924)									
ES1814998-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1815327-001	MW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1686924)									
ES1814998-001	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	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1815327-001	MW01	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	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: 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.

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				
EG020F: Dissolved Metals by ICP-MS (QCLot: 1686510)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.2	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.8	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.9	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.6	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	92.5	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 1686506)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	89.1	83	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1680874)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	80.9	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	82.5	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	82.2	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	81.8	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	102	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	87.4	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	88.4	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	92.1	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	90.4	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	89.2	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	74.9	62	119
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	95.9	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	83.6	63	117
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	91.1	60	118
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	90.1	61	117
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	96.2	59	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1680875)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	88.6	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	98.0	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	80.6	75	113
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1686924)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	98.3	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1680875)								



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: 1680875) - continued								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	92.6	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	92.6	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	90.5	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1686924)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	99.1	75	127
EP080: BTEXN (QCLot: 1686924)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	94.3	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	100	70	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	100	69	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.7	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	98.9	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**

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: 1686510)							
ES1815278-009	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	94.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	96.3	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	95.6	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	94.8	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	107	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	98.5	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	96.4	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1686506)							
ES1814998-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	98.4	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1680874)							
ES1815285-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	20 µg/L	73.0	70	130
		EP075(SIM): Pyrene	129-00-0	20 µg/L	90.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1680875)							
ES1815285-002	Anonymous	EP071: C10 - C14 Fraction	----	200 µg/L	# Not Determined	74	150

Page : 7 of 7
 Work Order : ES1815327
 Client : SULLIVAN ENVIRONMENTAL SCIENCES
 Project : SES_483



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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1680875) - continued							
ES1815285-002	Anonymous	EP071: C15 - C28 Fraction	----	300 µg/L	# Not Determined	77	153
		EP071: C29 - C36 Fraction	----	200 µg/L	114	67	153
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1686924)							
ES1814998-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	106	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1680875)							
ES1815285-002	Anonymous	EP071: >C10 - C16 Fraction	----	250 µg/L	104	74	150
		EP071: >C16 - C34 Fraction	----	350 µg/L	# Not Determined	77	153
		EP071: >C34 - C40 Fraction	----	150 µg/L	109	67	153
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1686924)							
ES1814998-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	108	70	130
EP080: BTEXN (QCLot: 1686924)							
ES1814998-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	94.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	104	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	106	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	107	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	99.5	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1815327	Page	: 1 of 5
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 25-May-2018
Site	: ----	Issue Date	: 01-Jun-2018
Sampler	: ----	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.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP080/071: Total Petroleum Hydrocarbons	ES1815285--002	Anonymous	C10 - C14 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Petroleum Hydrocarbons	ES1815285--002	Anonymous	C15 - C28 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	ES1815285--002	Anonymous	>C16 - C34 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

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.

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
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F) MW01, MW03, MW02, Q01	23-May-2018	----	----	----	30-May-2018	19-Nov-2018	✓
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F) MW01, MW03, MW02, Q01	23-May-2018	----	----	----	30-May-2018	20-Jun-2018	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) MW01, MW03, MW02, Q01	23-May-2018	28-May-2018	30-May-2018	✓	29-May-2018	07-Jul-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)								
MW01, MW03,	MW02, Q01	23-May-2018	28-May-2018	30-May-2018	✔	29-May-2018	07-Jul-2018	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
MW01, MW03,	MW02, Q01	23-May-2018	31-May-2018	06-Jun-2018	✔	31-May-2018	06-Jun-2018	✔
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
MW01, MW03,	MW02, Q01	23-May-2018	28-May-2018	30-May-2018	✔	29-May-2018	07-Jul-2018	✔
Amber VOC Vial - Sulfuric Acid (EP080)								
MW01, MW03,	MW02, Q01	23-May-2018	31-May-2018	06-Jun-2018	✔	31-May-2018	06-Jun-2018	✔
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
MW01, MW03,	MW02, Q01	23-May-2018	31-May-2018	06-Jun-2018	✔	31-May-2018	06-Jun-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)							
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2	17	11.76	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	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.88	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	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.88	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	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	17	5.88	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	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
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)
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)
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
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 RECEIPT NOTIFICATION (SRN)

Work Order : ES1815327

Client : SULLIVAN ENVIRONMENTAL SCIENCES Contact : ADAM SULLIVAN Address : PO Box 5248 TURRAMURRA NSW 2074 E-mail : adam@sullivan-es.com.au Telephone : ---- Facsimile : ---- Project : SES_483 Order number : ---- C-O-C number : ---- Site : ---- Sampler :	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 : ES2015SULENV0034 (EN/222/17) QC Level : NEPM 2013 B3 & ALS QC Standard
---	---

Dates

Date Samples Received : 25-May-2018 14:00 Client Requested Due Date : 01-Jun-2018	Issue Date : 26-May-2018 Scheduled Reporting Date : 01-Jun-2018
---	--

Delivery Details

Mode of Delivery : Undefined No. of coolers/boxes : 1 Receipt Detail :	Security Seal : Intact. Temperature : 2.8' C - Ice present 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.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- 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 - W-26 TPH/BTEXN/PAH/8 Metals
ES1815327-001	23-May-2018 00:00	MW01	✓
ES1815327-002	23-May-2018 00:00	MW02	✓
ES1815327-003	23-May-2018 00:00	MW03	✓
ES1815327-004	23-May-2018 00:00	Q01	✓

Proactive Holding Time Report

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

Requested Deliverables

ADAM SULLIVAN

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

CHAIN OF CUSTODY FORM

[illegible]

CERTIFICATE OF ANALYSIS

Work Order : **ES1828434**
Client : **SULLIVAN ENVIRONMENTAL SCIENCES**
Contact : ADAM SULLIVAN
Address : PO Box 5248
 TURRAMURRA NSW 2074
Telephone : ----
Project : SES_483
Order number :
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : EN/222
No. of samples received : 12
No. of samples analysed : 12

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 : 25-Sep-2018 14:00
Date Analysis Commenced : 26-Sep-2018
Issue Date : 03-Oct-2018 14:25



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
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ivan Taylor	Analyst	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.

- EG035: Positive Hg result for ES1828434 #10 has been confirmed by reanalysis.
- EP075: 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB13_0.2-0.3	QC4	SB14_0.0-0.2	SB15_0-0.1	SB16_0-0.1
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-001	ES1828434-002	ES1828434-003	ES1828434-004	ES1828434-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		11.4	12.4	10.4	8.8	3.9
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		34.1	----	----	42.6	----
APPROVED IDENTIFIER:	----	-	--		G.MORGAN	----	----	G.MORGAN	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		7	12	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		10	14	22	23	11
Copper	7440-50-8	5	mg/kg		31	26	52	89	100
Lead	7439-92-1	5	mg/kg		16	37	41	56	24
Nickel	7440-02-0	2	mg/kg		30	24	38	73	105
Zinc	7440-66-6	5	mg/kg		37	44	215	495	137
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	2.7	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	0.7	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	4.2	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	3.5	<0.5	<0.5
Benzo(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	1.3	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	1.1	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	1.3	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	0.7	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	1.2	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	0.6	<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	0.8	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB13_0.2-0.3	QC4	SB14_0.0-0.2	SB15_0-0.1	SB16_0-0.1
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-001	ES1828434-002	ES1828434-003	ES1828434-004	ES1828434-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	18.1	<0.5	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	1.6	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	1.8	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	2.1	1.2	1.2
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	0.5	mg/kg		<0.5	----	<0.5	<0.5	<0.5
Diethyl phthalate	84-66-2	0.5	mg/kg		<0.5	----	<0.5	<0.5	<0.5
Di-n-butyl phthalate	84-74-2	0.5	mg/kg		<0.5	----	<0.5	<0.5	<0.5
Butyl benzyl phthalate	85-68-7	0.5	mg/kg		<0.5	----	<0.5	<0.5	<0.5
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg		<5.0	----	<5.0	<5.0	<5.0
Di-n-octylphthalate	117-84-0	0.5	mg/kg		<0.5	----	<0.5	<0.5	<0.5
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	120	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	120	<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	140	<100	170
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	140	<50	170
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB13_0.2-0.3	QC4	SB14_0.0-0.2	SB15_0-0.1	SB16_0-0.1
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-001	ES1828434-002	ES1828434-003	ES1828434-004	ES1828434-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ 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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		70.2	72.4	72.4	77.8	73.0
2-Chlorophenol-D4	93951-73-6	0.5	%		73.1	73.4	74.6	77.4	71.8
2,4,6-Tribromophenol	118-79-6	0.5	%		48.3	52.1	50.2	56.4	50.1
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		81.1	84.7	84.3	86.0	81.0
Anthracene-d10	1719-06-8	0.5	%		79.6	83.3	82.9	84.2	81.6
4-Terphenyl-d14	1718-51-0	0.5	%		72.4	76.4	73.4	77.4	74.7
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	0.5	%		111	----	104	115	122
Phenol-d6	13127-88-3	0.5	%		102	----	106	96.6	100
2-Chlorophenol-D4	93951-73-6	0.5	%		111	----	106	103	109
2,4,6-Tribromophenol	118-79-6	0.5	%		77.1	----	72.5	82.6	74.6
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	0.5	%		103	----	85.7	86.4	92.4
1,2-Dichlorobenzene-D4	2199-69-1	0.5	%		108	----	96.9	95.0	108
2-Fluorobiphenyl	321-60-8	0.5	%		125	----	117	122	124
Anthracene-d10	1719-06-8	0.5	%		99.3	----	99.6	101	98.1
4-Terphenyl-d14	1718-51-0	0.5	%		97.5	----	98.3	95.1	93.2
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		111	101	104	102	105
Toluene-D8	2037-26-5	0.2	%		118	106	118	115	120
4-Bromofluorobenzene	460-00-4	0.2	%		118	104	112	109	112



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB17_0-0.1	SB18_0-0.1	SB19_0-0.1	SB20_SS	SB21_SS
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-006	ES1828434-007	ES1828434-008	ES1828434-009	ES1828434-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		5.8	4.9	9.8	6.5	27.2
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		59.8	----	----	----	21.9
APPROVED IDENTIFIER:	----	-	--		G.MORGAN	----	----	----	G.MORGAN
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	6
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	2	4
Chromium	7440-47-3	2	mg/kg		12	11	27	24	46
Copper	7440-50-8	5	mg/kg		93	82	2060	740	349
Lead	7439-92-1	5	mg/kg		26	<5	100	1080	1030
Nickel	7440-02-0	2	mg/kg		116	127	66	87	100
Zinc	7440-66-6	5	mg/kg		96	50	827	12500	2610
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	0.3
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB17_0-0.1	SB18_0-0.1	SB19_0-0.1	SB20_SS	SB21_SS
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-006	ES1828434-007	ES1828434-008	ES1828434-009	ES1828434-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ 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
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	0.5	mg/kg		<0.5	<0.5	<0.5	0.8	<0.5
Diethyl phthalate	84-66-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	84-74-2	0.5	mg/kg		<0.5	<0.5	<0.5	2.4	<0.5
Butyl benzyl phthalate	85-68-7	0.5	mg/kg		<0.5	<0.5	1.5	9.5	2.8
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg		<5.0	<5.0	30.7	46.2	6.2
Di-n-octylphthalate	117-84-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
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	670	1360	610
C29 - C36 Fraction	----	100	mg/kg		<100	<100	370	820	820
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	1040	2180	1430
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	960	1990	1190
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	170	420	540
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	1130	2410	1730
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB17_0-0.1	SB18_0-0.1	SB19_0-0.1	SB20_SS	SB21_SS
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00	24-Sep-2018 00:00
Compound	CAS Number	LOR	Unit		ES1828434-006	ES1828434-007	ES1828434-008	ES1828434-009	ES1828434-010
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
^ 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
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		73.4	72.1	72.7	70.8	70.7
2-Chlorophenol-D4	93951-73-6	0.5	%		75.9	74.0	74.5	72.8	74.6
2,4,6-Tribromophenol	118-79-6	0.5	%		53.5	50.5	56.6	58.8	66.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		84.6	83.4	83.1	80.6	82.8
Anthracene-d10	1719-06-8	0.5	%		86.0	84.9	82.2	80.4	81.2
4-Terphenyl-d14	1718-51-0	0.5	%		77.5	76.0	74.7	72.9	74.6
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	0.5	%		121	112	117	118	112
Phenol-d6	13127-88-3	0.5	%		96.0	98.5	102	101	93.0
2-Chlorophenol-D4	93951-73-6	0.5	%		110	104	107	97.5	112
2,4,6-Tribromophenol	118-79-6	0.5	%		64.4	65.1	79.8	74.1	84.1
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	0.5	%		81.8	87.8	89.6	84.8	79.4
1,2-Dichlorobenzene-D4	2199-69-1	0.5	%		93.2	97.6	101	97.4	101
2-Fluorobiphenyl	321-60-8	0.5	%		114	103	108	114	107
Anthracene-d10	1719-06-8	0.5	%		94.2	103	97.9	92.4	93.6
4-Terphenyl-d14	1718-51-0	0.5	%		91.2	99.2	96.9	89.6	88.8
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		92.6	103	91.9	85.1	97.3
Toluene-D8	2037-26-5	0.2	%		111	113	111	97.1	108
4-Bromofluorobenzene	460-00-4	0.2	%		102	109	101	90.2	103



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB22_SS	T.B.1	----	----	----
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1828434-011	ES1828434-012	-----	-----	-----
					Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		4.0	----	----	----	----
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		47.5	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		G.MORGAN	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		30	----	----	----	----
Copper	7440-50-8	5	mg/kg		462	----	----	----	----
Lead	7439-92-1	5	mg/kg		651	----	----	----	----
Nickel	7440-02-0	2	mg/kg		105	----	----	----	----
Zinc	7440-66-6	5	mg/kg		939	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg		<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)anthracene	56-55-3	0.5	mg/kg		<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB22_SS	T.B.1	----	----	----
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1828434-011	ES1828434-012	-----	-----	-----
					Result	Result	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	----	----	----	----
EP075C: Phthalate Esters									
Dimethyl phthalate	131-11-3	0.5	mg/kg		2.5	----	----	----	----
Diethyl phthalate	84-66-2	0.5	mg/kg		<0.5	----	----	----	----
Di-n-butyl phthalate	84-74-2	0.5	mg/kg		1.4	----	----	----	----
Butyl benzyl phthalate	85-68-7	0.5	mg/kg		2.4	----	----	----	----
bis(2-ethylhexyl) phthalate	117-81-7	5.0	mg/kg		14.7	----	----	----	----
Di-n-octylphthalate	117-84-0	0.5	mg/kg		<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg		860	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg		760	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		1620	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		1450	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		450	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1900	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB22_SS	T.B.1	----	----	----
Client sampling date / time					24-Sep-2018 00:00	24-Sep-2018 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1828434-011	ES1828434-012	-----	-----	-----
					Result	Result	----	----	----
EP080: BTEXN - Continued									
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		74.9	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		78.7	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		66.2	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		86.6	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		85.3	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		79.6	----	----	----	----
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	0.5	%		106	----	----	----	----
Phenol-d6	13127-88-3	0.5	%		101	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		94.3	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%		65.3	----	----	----	----
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	0.5	%		81.6	----	----	----	----
1,2-Dichlorobenzene-D4	2199-69-1	0.5	%		84.6	----	----	----	----
2-Fluorobiphenyl	321-60-8	0.5	%		113	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%		83.3	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		70.4	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		92.8	106	----	----	----
Toluene-D8	2037-26-5	0.2	%		104	121	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		97.3	115	----	----	----

Page : 12 of 13
Work Order : ES1828434
Client : SULLIVAN ENVIRONMENTAL SCIENCES
Project : SES_483



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	SB13_0.2-0.3 - 24-Sep-2018 00:00	Mid brown sandy soil.
EA200: Description	SB15_0-0.1 - 24-Sep-2018 00:00	Mid brown sandy soil.
EA200: Description	SB17_0-0.1 - 24-Sep-2018 00:00	Mid brown sandy soil.
EA200: Description	SB21_SS - 24-Sep-2018 00:00	Mid brown sandy soil.
EA200: Description	SB22_SS - 24-Sep-2018 00:00	Mid brown sandy soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
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
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	29	149
Phenol-d6	13127-88-3	32	128
2-Chlorophenol-D4	93951-73-6	32	128
2,4,6-Tribromophenol	118-79-6	13	121
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	33	125
1,2-Dichlorobenzene-D4	2199-69-1	34	108
2-Fluorobiphenyl	321-60-8	35	121
Anthracene-d10	1719-06-8	35	123
4-Terphenyl-d14	1718-51-0	33	125
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

QUALITY CONTROL REPORT

Work Order	: ES1828434	Page	: 1 of 8
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	: Customer Services ES
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 25-Sep-2018
Order number	: ----	Date Analysis Commenced	: 26-Sep-2018
C-O-C number	: ----	Issue Date	: 03-Oct-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 12		
No. of samples analysed	: 12		



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
Gerrad Morgan	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

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

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1954323)									
ES1828430-002	Anonymous	EA055: Moisture Content	----	0.1	%	4.9	5.8	17.2	No Limit
ES1828431-011	Anonymous	EA055: Moisture Content	----	0.1	%	6.8	6.6	2.48	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 1954324)									
ES1828434-008	SB19_0-0.1	EA055: Moisture Content	----	0.1	%	9.8	8.0	20.4	No Limit
ES1828511-004	Anonymous	EA055: Moisture Content	----	0.1	%	20.7	20.2	2.50	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 1956492)									
ES1828434-001	SB13_0.2-0.3	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	17	51.3	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	30	34	12.3	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	12	51.6	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	31	39	21.9	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	30	60.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	37	48	27.1	No Limit
ES1828434-011	SB22_SS	EG005T: Cadmium	7440-43-9	1	mg/kg	1	1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	30	34	14.9	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	105	90	14.8	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	462	385	18.1	0% - 20%
		EG005T: Lead	7439-92-1	5	mg/kg	651	770	16.7	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	939	978	4.06	0% - 20%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1956493)									
ES1828434-001	SB13_0.2-0.3	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1828434-011	SB22_SS	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 1951024)									



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: 1951024) - continued									
ES1828434-011	SB22_SS	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): Dibenzo(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
ES1828434-001	SB13_0.2-0.3	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): Dibenzo(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



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 (%)
EP075C: Phthalate Esters (QC Lot: 1951026)									
ES1828434-001	SB13_0.2-0.3	EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1951025)									
ES1828434-011	SB22_SS	EP071: C15 - C28 Fraction	----	100	mg/kg	860	830	3.58	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	760	760	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1828434-001	SB13_0.2-0.3	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1951102)									
ES1828434-001	SB13_0.2-0.3	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1828434-009	SB20_SS	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1951025)									
ES1828434-011	SB22_SS	EP071: >C16 - C34 Fraction	----	100	mg/kg	1450	1400	3.58	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	450	470	3.84	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1828434-001	SB13_0.2-0.3	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1951102)									
ES1828434-001	SB13_0.2-0.3	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1828434-009	SB20_SS	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 1951102)									
ES1828434-001	SB13_0.2-0.3	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
ES1828434-009	SB20_SS	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



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: 1951102) - continued									
ES1828434-009	SB20_SS	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<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**

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				
EG005T: Total Metals by ICP-AES (QCLot: 1956492)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	109	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	105	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	95.6	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	104	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	106	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	109	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	112	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1956493)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	93.1	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1951024)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	113	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	110	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	111	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	112	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	113	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	115	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	101	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	109	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	97.7	68	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	109	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	108	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	96.4	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	94.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	96.5	63	121
EP075C: Phthalate Esters (QCLot: 1951026)								
EP075: Dimethyl phthalate	131-11-3	0.5	mg/kg	<0.5	1.5 mg/kg	102	60	118
EP075: Diethyl phthalate	84-66-2	0.5	mg/kg	<0.5	1.5 mg/kg	114	65	115
EP075: Di-n-butyl phthalate	84-74-2	0.5	mg/kg	<0.5	1.5 mg/kg	103	65	121
EP075: Butyl benzyl phthalate	85-68-7	0.5	mg/kg	<0.5	1.5 mg/kg	113	62	116
EP075: bis(2-ethylhexyl) phthalate	117-81-7	----	mg/kg	----	1.5 mg/kg	102	69	133
EP075: Di-n-octylphthalate	117-84-0	0.5	mg/kg	<0.5	1.5 mg/kg	98.8	62	124



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: 1951025)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	90.0	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	112	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	119	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1951102)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	103	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1951025)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	117	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	112	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	98.4	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1951102)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	108	68	128
EP080: BTEXN (QCLot: 1951102)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	108	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	109	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	107	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	105	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	106	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	112	63	119

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				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: 1956492)							
ES1828434-001	SB13_0.2-0.3	EG005T: Arsenic	7440-38-2	50 mg/kg	114	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	113	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	103	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	107	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	99.4	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	124	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1956493)							
ES1828434-001	SB13_0.2-0.3	EG035T: Mercury	7439-97-6	5 mg/kg	102	70	130



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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1951024)							
ES1828434-001	SB13_0.2-0.3	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	94.1	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	109	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1951025)							
ES1828434-001	SB13_0.2-0.3	EP071: C10 - C14 Fraction	----	523 mg/kg	119	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	110	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	131	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1951102)							
ES1828434-001	SB13_0.2-0.3	EP080: C6 - C9 Fraction	----	32.5 mg/kg	86.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1951025)							
ES1828434-001	SB13_0.2-0.3	EP071: >C10 - C16 Fraction	----	860 mg/kg	122	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	106	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	114	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1951102)							
ES1828434-001	SB13_0.2-0.3	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	87.5	70	130
EP080: BTEXN (QCLot: 1951102)							
ES1828434-001	SB13_0.2-0.3	EP080: Benzene	71-43-2	2.5 mg/kg	80.4	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	83.3	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	83.0	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	82.0	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	83.6	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	83.6	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1828434	Page	: 1 of 6
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 25-Sep-2018
Site	: ----	Issue Date	: 03-Oct-2018
Sampler	: ----	No. of samples received	: 12
Order number	:	No. of samples analysed	: 12

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.

Sub-Matrix: SOIL

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075T: Base/Neutral Extractable Surrogates	ES1828434-001	SB13_0.2-0.3	2-Fluorobiphenyl	321-60-8	125 %	35-121 %	Recovery greater than upper data quality objective
EP075T: Base/Neutral Extractable Surrogates	ES1828434-004	SB15_0-0.1	2-Fluorobiphenyl	321-60-8	122 %	35-121 %	Recovery greater than upper data quality objective
EP075T: Base/Neutral Extractable Surrogates	ES1828434-005	SB16_0-0.1	2-Fluorobiphenyl	321-60-8	124 %	35-121 %	Recovery greater than upper data quality objective

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.

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)							
SB13_0.2-0.3, QC4,	24-Sep-2018	----	----	----	27-Sep-2018	08-Oct-2018	✓
SB14_0.0-0.2, SB15_0-0.1,							
SB16_0-0.1, SB17_0-0.1,							
SB18_0-0.1, SB19_0-0.1,							
SB20_SS, SB21_SS,							
SB22_SS							
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag: Separate bag received (EA200)							
SB13_0.2-0.3, SB15_0-0.1,	24-Sep-2018	----	----	----	27-Sep-2018	23-Mar-2019	✓
SB17_0-0.1, SB21_SS,							
SB22_SS							
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
SB13_0.2-0.3, QC4,	24-Sep-2018	28-Sep-2018	23-Mar-2019	✓	28-Sep-2018	23-Mar-2019	✓
SB14_0.0-0.2, SB15_0-0.1,							
SB16_0-0.1, SB17_0-0.1,							
SB18_0-0.1, SB19_0-0.1,							
SB20_SS, SB21_SS,							
SB22_SS							



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)		24-Sep-2018	28-Sep-2018	22-Oct-2018	✔	29-Sep-2018	22-Oct-2018	✔
SB13_0.2-0.3,	QC4,							
SB14_0.0-0.2,	SB15_0-0.1,							
SB16_0-0.1,	SB17_0-0.1,							
SB18_0-0.1,	SB19_0-0.1,							
SB20_SS,	SB21_SS,							
SB22_SS								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))		24-Sep-2018	26-Sep-2018	08-Oct-2018	✔	27-Sep-2018	05-Nov-2018	✔
SB13_0.2-0.3,	QC4,							
SB14_0.0-0.2,	SB15_0-0.1,							
SB16_0-0.1,	SB17_0-0.1,							
SB18_0-0.1,	SB19_0-0.1,							
SB20_SS,	SB21_SS,							
SB22_SS								
EP075C: Phthalate Esters								
Soil Glass Jar - Unpreserved (EP075)		24-Sep-2018	26-Sep-2018	08-Oct-2018	✔	27-Sep-2018	05-Nov-2018	✔
SB13_0.2-0.3,	SB14_0.0-0.2,							
SB15_0-0.1,	SB16_0-0.1,							
SB17_0-0.1,	SB18_0-0.1,							
SB19_0-0.1,	SB20_SS,							
SB21_SS,	SB22_SS							
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)		24-Sep-2018	26-Sep-2018	08-Oct-2018	✔	27-Sep-2018	08-Oct-2018	✔
SB13_0.2-0.3,	QC4,							
SB14_0.0-0.2,	SB15_0-0.1,							
SB16_0-0.1,	SB17_0-0.1,							
SB18_0-0.1,	SB19_0-0.1,							
SB20_SS,	SB21_SS,							
SB22_SS								
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)		24-Sep-2018	26-Sep-2018	08-Oct-2018	✔	27-Sep-2018	08-Oct-2018	✔
SB13_0.2-0.3,	QC4,							
SB14_0.0-0.2,	SB15_0-0.1,							
SB16_0-0.1,	SB17_0-0.1,							
SB18_0-0.1,	SB19_0-0.1,							
SB20_SS,	SB21_SS,							
SB22_SS								

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)							
SB13_0.2-0.3, QC4,	24-Sep-2018	26-Sep-2018	08-Oct-2018	✓	27-Sep-2018	08-Oct-2018	✓
SB14_0.0-0.2, SB15_0-0.1,							
SB16_0-0.1, SB17_0-0.1,							
SB18_0-0.1, SB19_0-0.1,							
SB20_SS, SB21_SS,							
SB22_SS, T.B.1							



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	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	7.14	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)
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.
Semivolatile Organic Compounds	EP075	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 502)
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.
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, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : ES1828434**

Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	: Customer Services ES
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: adam@sullivan-es.com.au	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: SES_483	Page	: 1 of 2
Order number	:	Quote number	: ES2015SULENV0034 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	:		

Dates

Date Samples Received	: 25-Sep-2018 14:00	Issue Date	: 26-Sep-2018
Client Requested Due Date	: 03-Oct-2018	Scheduled Reporting Date	: 03-Oct-2018

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 4.0 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 12 / 12

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.**
- **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	SOIL - EA055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - EP075C Phthalates Phthalate Esters - 6 analytes	SOIL - EP080 BTEXN	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1828434-001	24-Sep-2018 00:00	SB13_0.2-0.3	✓	✓	✓		✓
ES1828434-002	24-Sep-2018 00:00	QC4	✓				✓
ES1828434-003	24-Sep-2018 00:00	SB14_0.0-0.2	✓		✓		✓
ES1828434-004	24-Sep-2018 00:00	SB15_0-0.1	✓	✓	✓		✓
ES1828434-005	24-Sep-2018 00:00	SB16_0-0.1	✓		✓		✓
ES1828434-006	24-Sep-2018 00:00	SB17_0-0.1	✓	✓	✓		✓
ES1828434-007	24-Sep-2018 00:00	SB18_0-0.1	✓		✓		✓
ES1828434-008	24-Sep-2018 00:00	SB19_0-0.1	✓		✓		✓
ES1828434-009	24-Sep-2018 00:00	SB20_SS	✓		✓		✓
ES1828434-010	24-Sep-2018 00:00	SB21_SS	✓	✓	✓		✓
ES1828434-011	24-Sep-2018 00:00	SB22_SS	✓	✓	✓		✓
ES1828434-012	24-Sep-2018 00:00	T.B.1				✓	

Proactive Holding Time Report

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

Requested Deliverables

ADAM SULLIVAN

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

CERTIFICATE OF ANALYSIS

Work Order : **ES1829628**
Client : **SULLIVAN ENVIRONMENTAL SCIENCES**
Contact : ADAM SULLIVAN
Address : PO Box 5248
 TURRAMURRA NSW 2074
Telephone : ----
Project : SES_483
Order number :
C-O-C number : ----
Sampler : A.Sullivan
Site : ----
Quote number : EN/222
No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 6
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-Oct-2018 16:30
Date Analysis Commenced : 08-Oct-2018
Issue Date : 11-Oct-2018 13:29



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>
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	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.

- EP075: 'Sum of PAH' is the sum of the USEPA 16 priority PAHs
- 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

				SW01	Q1	SW02	----	----
Client sampling date / time				04-Oct-2018 00:00	04-Oct-2018 00:00	04-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1829628-001	ES1829628-002	ES1829628-003	-----	-----
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.004	----	----
Cadmium	7440-43-9	0.0001	mg/L	0.0009	0.0009	0.0013	----	----
Chromium	7440-47-3	0.001	mg/L	0.008	0.008	0.029	----	----
Copper	7440-50-8	0.001	mg/L	0.064	0.065	0.181	----	----
Lead	7439-92-1	0.001	mg/L	0.201	0.205	0.203	----	----
Nickel	7440-02-0	0.001	mg/L	0.012	0.013	0.076	----	----
Zinc	7440-66-6	0.005	mg/L	0.586	0.580	0.923	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<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	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<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	----	----
EP075C: Phthalate Esters								
Dimethyl phthalate	131-11-3	2	µg/L	<2	<2	<2	----	----
Diethyl phthalate	84-66-2	2	µg/L	<2	<2	<2	----	----
Di-n-butyl phthalate	84-74-2	2	µg/L	<2	<2	<2	----	----
Butyl benzyl phthalate	85-68-7	2	µg/L	<2	<2	<2	----	----
bis(2-ethylhexyl) phthalate	117-81-7	10	µg/L	<10	<10	<10	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	Q1	SW02	----	----
Client sampling date / time					04-Oct-2018 00:00	04-Oct-2018 00:00	04-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1829628-001	ES1829628-002	ES1829628-003	-----	-----
					Result	Result	Result	----	----
EP075C: Phthalate Esters - Continued									
Di-n-octylphthalate	117-84-0	2	µg/L		<2	<2	<2	----	----
Di (2-ethylhexyl) adipate	103-23-1	2	µg/L		<2	<2	<2	----	----
^ Sum of Phthalates	----	2	µg/L		<2	<2	<2	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		700	690	1760	----	----
C29 - C36 Fraction	----	50	µg/L		170	130	540	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		870	820	2300	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<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	----	----
>C16 - C34 Fraction	----	100	µg/L		780	780	2060	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	130	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		780	780	2190	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	----	----
^ Total Xylenes	----	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	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	1.0	%		26.4	24.9	17.5	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%		55.9	51.8	43.5	----	----
2,4,6-Tribromophenol	118-79-6	1.0	%		70.8	70.0	69.0	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	1.0	%		91.7	86.9	73.8	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	Q1	SW02	----	----
Client sampling date / time					04-Oct-2018 00:00	04-Oct-2018 00:00	04-Oct-2018 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1829628-001	ES1829628-002	ES1829628-003	-----	-----
					Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates - Continued									
Anthracene-d10	1719-06-8	1.0	%		88.5	84.3	90.3	----	----
4-Terphenyl-d14	1718-51-0	1.0	%		89.1	87.4	93.3	----	----
EP075S: Acid Extractable Surrogates									
2-Fluorophenol	367-12-4	2	%		26.2	21.6	11.5	----	----
Phenol-d6	13127-88-3	2	%		18.5	14.7	12.3	----	----
2-Chlorophenol-D4	93951-73-6	2	%		40.3	31.9	23.8	----	----
2,4,6-Tribromophenol	118-79-6	2	%		63.8	55.2	56.3	----	----
EP075T: Base/Neutral Extractable Surrogates									
Nitrobenzene-D5	4165-60-0	2	%		50.0	42.6	28.0	----	----
1,2-Dichlorobenzene-D4	2199-69-1	2	%		57.2	54.9	31.5	----	----
2-Fluorobiphenyl	321-60-8	2	%		86.6	78.2	72.9	----	----
Anthracene-d10	1719-06-8	2	%		66.8	64.9	73.4	----	----
4-Terphenyl-d14	1718-51-0	2	%		54.4	57.7	40.0	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		117	112	116	----	----
Toluene-D8	2037-26-5	2	%		105	102	106	----	----
4-Bromofluorobenzene	460-00-4	2	%		89.9	88.4	89.8	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
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
EP075S: Acid Extractable Surrogates			
2-Fluorophenol	367-12-4	10	117
Phenol-d6	13127-88-3	10	69
2-Chlorophenol-D4	93951-73-6	21	130
2,4,6-Tribromophenol	118-79-6	10	151
EP075T: Base/Neutral Extractable Surrogates			
Nitrobenzene-D5	4165-60-0	29	142
1,2-Dichlorobenzene-D4	2199-69-1	24	121
2-Fluorobiphenyl	321-60-8	27	135
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	21	123
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	: ES1829628	Page	: 1 of 6
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Contact	: Customer Services ES
Address	: PO Box 5248 TURRAMURRA NSW 2074	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 05-Oct-2018
Order number	: ----	Date Analysis Commenced	: 08-Oct-2018
C-O-C number	: ----	Issue Date	: 11-Oct-2018
Sampler	: A.Sullivan		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		



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 Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

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 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

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				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: 1968718)									
ES1829568-002	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	0.002	0.002	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.006	0.008	25.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.016	0.017	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.020	0.021	5.09	0% - 50%
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.055	0.056	0.00	0% - 50%
ES1829595-003	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	0.007	0.007	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1969263)									
ES1829568-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1829600-007	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: 1968963)									
ES1829266-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1829621-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	40	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 1968963)									
ES1829266-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1829621-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 1968963)									

Page : 3 of 6
 Work Order : ES1829628
 Client : SULLIVAN ENVIRONMENTAL SCIENCES
 Project : SES_483



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: 1968963) - continued									
ES1829266-001	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
ES1829621-001	Anonymous	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 (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EG020T: Total Metals by ICP-MS (QCLot: 1968718)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	82	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.5	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	95.0	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	98.5	79	117
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1969263)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	77	111
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 1969741)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	71.0	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	67.7	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	70.0	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	73.5	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	71.7	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.5	64	116
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	76.2	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	76.0	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	70.2	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	84.6	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	67.2	62	119
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	85.2	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	67.3	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	67.0	60	118
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	68.1	61	117
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	72.1	59	118
EP075C: Phthalate Esters (QCLot: 1969737)								
EP075: Dimethyl phthalate	131-11-3	2	µg/L	<2	10 µg/L	109	64	112
EP075: Diethyl phthalate	84-66-2	2	µg/L	<2	10 µg/L	90.6	67	111
EP075: Di-n-butyl phthalate	84-74-2	2	µg/L	<2	10 µg/L	97.1	68	122
EP075: Butyl benzyl phthalate	85-68-7	2	µg/L	<2	10 µg/L	93.5	61	114
EP075: bis(2-ethylhexyl) phthalate	117-81-7	----	µg/L	----	10 µg/L	95.6	60	132
EP075: Di-n-octylphthalate	117-84-0	2	µg/L	<2	10 µg/L	96.0	62	115

Matrix Spike (MS) Report

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: 1968718)							
ES1829568-003	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.2	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.2	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	91.2	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	104	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	98.0	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.2	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1969263)							

Page : 6 of 6
 Work Order : ES1829628
 Client : SULLIVAN ENVIRONMENTAL SCIENCES
 Project : SES_483



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
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1969263) - continued							
ES1829568-005	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	103	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1968963)							
ES1829266-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	119	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 1968963)							
ES1829266-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	122	70	130
EP080: BTEXN (QCLot: 1968963)							
ES1829266-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	96.8	70	130
		EP080: Toluene	108-88-3	25 µg/L	95.6	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.4	70	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	102	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	108	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	105	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1829628	Page	: 1 of 5
Client	: SULLIVAN ENVIRONMENTAL SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: ADAM SULLIVAN	Telephone	: +61-2-8784 8555
Project	: SES_483	Date Samples Received	: 05-Oct-2018
Site	: ----	Issue Date	: 11-Oct-2018
Sampler	: A.Sullivan	No. of samples received	: 3
Order number	:	No. of samples analysed	: 3

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

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



Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP075T: Base/Neutral Extractable Surrogates	ES1829628-003	SW02	Nitrobenzene-D5	4165-60-0	28.0 %	29-142 %	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	4	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	7	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: **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) SW01, Q1, SW02	04-Oct-2018	08-Oct-2018	02-Apr-2019	✔	08-Oct-2018	02-Apr-2019	✔
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T) SW01, Q1, SW02	04-Oct-2018	----	----	----	10-Oct-2018	01-Nov-2018	✔
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) SW01, Q1, SW02	04-Oct-2018	09-Oct-2018	11-Oct-2018	✔	10-Oct-2018	18-Nov-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	
EP075C: Phthalate Esters								
Amber Glass Bottle - Unpreserved (EP075) SW01, Q1, SW02	04-Oct-2018	09-Oct-2018	11-Oct-2018	✓	10-Oct-2018	18-Nov-2018	✓	
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) SW01, Q1, SW02	04-Oct-2018	09-Oct-2018	11-Oct-2018	✓	10-Oct-2018	18-Nov-2018	✓	
Amber VOC Vial - Sulfuric Acid (EP080) SW01, Q1, SW02	04-Oct-2018	08-Oct-2018	18-Oct-2018	✓	08-Oct-2018	18-Oct-2018	✓	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071) SW01, Q1, SW02	04-Oct-2018	09-Oct-2018	11-Oct-2018	✓	10-Oct-2018	18-Nov-2018	✓	
Amber VOC Vial - Sulfuric Acid (EP080) SW01, Q1, SW02	04-Oct-2018	08-Oct-2018	18-Oct-2018	✓	08-Oct-2018	18-Oct-2018	✓	
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) SW01, Q1, SW02	04-Oct-2018	08-Oct-2018	18-Oct-2018	✓	08-Oct-2018	18-Oct-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)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	4	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	7	0.00	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-MS - Suite A	EG020A-T	2	8	25.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	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-MS - Suite A	EG020A-T	1	8	12.50	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 (GC/MS - SIM)	EP075(SIM)	1	4	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	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-MS - Suite A	EG020A-T	1	8	12.50	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 (GC/MS - SIM)	EP075(SIM)	0	4	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Semivolatile Organic Compounds	EP075	0	7	0.00	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-MS - Suite A	EG020A-T	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
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)
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)
Semivolatile Organic Compounds	EP075	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
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)
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
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 RECEIPT NOTIFICATION (SRN)

Work Order : ES1829628

Client : SULLIVAN ENVIRONMENTAL SCIENCES Contact : ADAM SULLIVAN Address : PO Box 5248 TURRAMURRA NSW 2074 E-mail : adam@sullivan-es.com.au Telephone : ---- Facsimile : ---- Project : SES_483 Order number : ---- C-O-C number : ---- Site : ---- Sampler : A.Sullivan	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 : ES2015SULENV0034 (EN/222) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 05-Oct-2018 16:30 Client Requested Due Date : 11-Oct-2018	Issue Date : 06-Oct-2018 Scheduled Reporting Date : 11-Oct-2018
---	--

Delivery Details

Mode of Delivery : Undefined No. of coolers/boxes : 1 Receipt Detail :	Security Seal : Intact. Temperature : 1.0°C - Ice present No. of samples received / analysed : 3 / 3
--	--

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).**
- 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 - EP075C Phthalates SVOC - Phthalate Esters	WATER - W-26T TRH/BTEXN/PAH/Total 8 Metals
ES1829628-001	04-Oct-2018 00:00	SW01	✓	✓
ES1829628-002	04-Oct-2018 00:00	Q1	✓	✓
ES1829628-003	04-Oct-2018 00:00	SW02	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

ADAM SULLIVAN

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

CHAIN OF CUSTODY FORM

Sheet 1 of 1

THIS COLUMN FOR LAB USE ONLY Job Code: _____ Due Date: _____ Custody seal intact? YES ☐ NO ☐ Sample cold? YES ☐ NO ☐		FROM: Sullivan Environmental Sciences PO Box 5248 Turramurra NSW 2074 Ph: 0400 500 264 Project No: SES_483 Project Manager: A. Sullivan Agreement No: EN222/17 Released by: <i>[Signature]</i> Date: 5/10/18 Time: 3pm		TO: ALS Environmental Smithfield Email: adam@sullivan-es.com.au Sample(s): <i>[Signature]</i> Signature(s): <i>[Signature]</i> Checked: _____ Received by: _____ Date: _____ Time: _____		Container Size, Type, Preservative and Analysis Container Identification	
		Size Type* Preservative Code		Analytes W-26 (total metals) Phthalate Esters		Tick required analytes Total no 4 4 4	
Lab Identification 12 3		Date 4/10/18 "		Matrix Water "		Sample Number SW01 Q4 SW02	
Remarks:		Environmental Division Sydney Work Order Reference ES1829628  Telephone: +61 2 9784 8555					
Courier Job No:		* Container Type and Preservative Code Bottle, VC = Hydrochloric Acid Preservative Specify Turnaround Time:					
5/10/18 JUSTIN 4.30pm		TOTAL 12 3 3 Preserved; C = Sodium Hydroxide Preserved; J = Solvent Washed Acid Rinsed Jar; S = Solvent Washed Acid Rinsed Glass BS = Sulfuric Acid Preserved Glass Bottle; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle NOTE: SAMPLES MAY CONTAIN DANGEROUS AND HAZARDOUS SUBSTANCES					