



**Fire & Rescue NSW**  
Albion Park Training Facility  
Environmental Site Assessment - PFAS

April 2017







27 April 2017

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Fire & Rescue NSW  
PO Box A249  
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Our ref: 21/25583  
Your ref:

Dear Sally

## **Fire and Rescue NSW - Albion Park Training Facility Environmental Site Assessment - PFAS Addendum 1**

### **1 Introduction**

Between November and December 2016, GHD completed a combined preliminary and detailed site investigation at the Albion Park Training Facility located at Airport Road, Albion Park Rail, NSW 2527 (the site). The site has historically been used for the training of firefighters, which has potentially included the use of aqueous film forming foams (AFFF). The foams used may have contained perfluoro alkyl substances (PFAS), which are potentially harmful to human health and the environment.

The findings of the environmental site assessment (ESA) are presented in:

- GHD Pty Ltd (2017) *Report for Fire and Rescue NSW – Albion Park Training Facility Environmental Site Assessment – PFAS*. Final Report, April 2017 (the ESA report).

This addendum has been prepared following the release of new guidelines since the completion of the ESA report. This addendum must be read in conjunction with the GHD 2017 ESA report.

### **2 Basis for assessment**

As a result of the emerging nature of this issue, screening criteria for the assessment of PFAS impacted sites are still in the process of being developed in Australia. Only a few values have been published by Australian regulatory agencies, some of which are interim, draft or are “to be reviewed”.

Section 5 of the ESA report outlines the investigation levels used for the purpose of screening data reported from soil, groundwater, surface water and sediment samples collected during the November / December 2016 ESA.

For the purpose of screening groundwater and surface water data, reference was made to the interim screening criteria released by the Western Australia Department of Environment and Regulation (DER)<sup>1</sup> which are based on the enHealth (2016)<sup>2</sup> recommendations.

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<sup>1</sup> Department of Environment Regulation (DER), January 2017. *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, Contaminated Sites Guidelines, Government of Western Australia (WA)

<sup>2</sup> EnHealth, June 2016. *Interim national guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia*

In April 2017, Food Standards Australia New Zealand (FSANZ) released new guidance for the assessment of PFAS impacted sites. These new guidelines resulted in a reduction of the Tolerable Daily Intake (TDI) for key contaminants of concern including

- Perfluorooctane sulfonate (PFOS)
- Perfluorohexane sulfonate (PFHxS)
- Perfluorooctanoic acid (PFOA)

Changes to the TDI resulted in re-calculation of health based screening levels for the protection of drinking water and recreational water resources. These new values supersede the previous enHealth (2016) interim screening levels which were the basis of GHD's interpretation of data as outlined in the ESA report. Comparison of the FSANZ screening values, and the previous enHealth (2016) guidelines is provided in **Table 1**.

**Table 1 Screening level comparison**

Toxicity Reference Value	PFOS / PFHxS		PFOA	
	enHealth (2016)	FSANZ (2017)	enHealth (2016)	FSANZ (2017)
TDI	0.15 ug/kg/d	<b>0.02 ug/kg/d</b>	1.5 ug/kg/d	<b>0.16 ug/kg/d</b>
Drinking water quality guideline	0.5 ug/L	<b>0.07 ug/L</b>	5 ug/L	<b>0.56 ug/L</b>
Recreational water quality guideline	5 ug/L	<b>0.7 ug/L</b>	50 ug/L	<b>5.6 ug/L</b>

The revised FSANZ values focus on the assessment of potential risks to human health. These guidelines do not change any screening levels for the protection of ecological receptors and the screening criteria referenced in the ESA report (GHD, 2017) remain valid at the time of issue of this addenda.

### 3 Data review

**Table 2** presents a summary of the groundwater and surface water data reported by GHD (2017) compared against the new FSANZ guidelines. For analytical data, reference is made to the ESA report.

**Table 2 Interim data review**

Summary information	Groundwater Data	Surface Water Data
Number of samples collected	Five groundwater samples were collected including three on site samples (GW01 to GW03) and two off-site sample (GW04 and GW05)	Five surface water samples were collected including one sample collected within the bounds of the training facility (SW05) and four off-site samples (SW01 to SW04) collected from surface water receptors down-gradient of the site.
Review of data for protection of drinking water quality	All locations reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality. One location (GW03) reported a concentration of PFOA above the	All surface water samples reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of drinking water quality. One location (SW05) reported a concentration of PFOA above the FSANZ (2017) screening value for the protection of drinking water

Summary information	Groundwater Data	Surface Water Data
	FSANZ (2017) screening value for the protection of drinking water quality.	quality.
Review of data for protection of recreational water quality	One on-site location (GW03) reported a concentration of PFOS/PFHxS in groundwater above the FSANZ (2017) screening value for the protection of recreational water quality.	Surface water samples SW01, SW03 and SW05 reported concentrations of PFOS / PFHxS above the FSANZ (2017) screening value for the protection of recreational water quality. One location (SW05) reported a concentration of PFOA above the FSANZ (2017) screening value for the protection of recreational water quality.

Overall, the changes to the guidelines has resulted in the following changes to the interpretation of data reported by GHD (2017):

- Three additional groundwater locations (GW02, GW04 and GW05) reported concentrations of PFOS / PFHxS and one additional groundwater location (GW03) reported a concentration of PFOA above the screening criteria for the protection of drinking water. GHD is currently embarking on a program of further site investigations including additional groundwater investigations. As part of these works, a water use survey is being released to understand groundwater usage in the area and further assist in the assessment of the potential for exposure to PFAS impacted groundwater.
- Groundwater sample GW03 previously reported PFAS concentrations above the nominated enHealth (2016) screening values for the protection of recreational water quality. All other samples remain below the new 2017 FSANZ investigation levels. The revision to the FSANZ (2017) guidelines does not impact on the overall interpretation of this data and is not considered to affect the overall conceptual site model (CSM) and evaluation of risks to current site employees.
- Two additional surface water locations (SW02 and SW04) report concentrations of PFOS / PFHxS above the screening criteria for the protection of drinking water. Two additional surface water locations (SW01 and SW03) report concentrations of PFOS / PFHxS above the screening criteria for the protection of recreational water quality. One additional surface water location (SW05) reported concentrations of PFOA above the screening criteria for the protection of recreational water quality. As outlined above, GHD is currently embarking on a program of further site investigations including additional surface water investigations. As part of these works, a water use survey is being released to understand surface water usage in the area and further assist in the assessment of the potential for exposure to PFAS impacted surface water.

A detailed review of all data with respect to the new guidelines will be undertaken as part of the next stage of investigation and full interpretation of all results will be reported at the completion of these works.

Sincerely  
GHD Pty Ltd

A handwritten signature in black ink, appearing to read 'Hallchurch', written in a cursive style.

**Jacqui Hallchurch**  
Principal Environmental Scientist  
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# Executive summary

GHD Pty Ltd (GHD) was engaged by Fire and Rescue NSW (FRNSW) to provide environmental assessment services (the Project) for a land parcel identified within Lot 10 DP 1157377 located at Airport Road, Albion Park Rail NSW 2527.

The site has previously been used for the training of firefighters, which has potentially included the use of aqueous film forming foams (AFFF). The foams used may have contained perfluoro alkyl substances (PFASs) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

The site is owned by Shellharbour City Council and the site is currently leased by FRNSW for use as a firefighting training facility. The surrounding land use includes the Illawarra airport located to the west and south of the site and the Rural Fire Service (RFS) located to the north of the site followed by vacant lot. To the west is a small area of bushland followed by Hargraves Avenue and residential properties.

The overall objective of the investigation is to characterise impacts and subsequently assess the potential risks to human health and the environment from historical firefighting training activities at the site.

The scope of work comprised:

- Drilling and installation of five groundwater monitoring wells including two on-site locations (GW01 and GW02) and three off-site locations (GW03 to GW05).
- A groundwater monitoring event (GME) including slug testing of five groundwater wells.
- Collection of five surface water samples (SW01 to SW05) and five sediment samples (SS01 to SS05)
- Laboratory analysis of selected soil, sediment, surface water and groundwater samples for chemicals of potential concern (COPC) including
  - PFAS, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals, total organic carbon (TOC), total iron, potassium, aluminium, silicon in selected soil and sediment samples
  - PFAS, TRH, BTEXN, PAH and heavy metals (standard laboratory limit of reporting), major ions and total dissolved solids (TDS) in groundwater and surface water samples
- Laboratory analysis of a selection of soil samples for Australian standard leaching procedure (ASLP) and toxicity characteristics leaching procedure (TCLP)
- Laboratory analysis of a retrieved section of asphalt for PFAS
- A quality control and quality assurance (QA/QC) program
- Preparation of this environmental site assessment report ( this report)
- Surveying of newly installed wells.

The following conclusions were made:

- The subsurface investigations encountered silty sand fill underlain by alluvial clay to a maximum investigation depth of 6.6 m bgl.

- Standing water levels in on-site wells were recorded to be between 2.61 m btoc (GW04) and 3.35 m btoc (GW02). The general groundwater flow direction was inferred to be towards the north-east.
- Analysis of the soil and sediment samples indicated the following:
  - Heavy metal ecological exceedances were reported at two locations on site (SB08 and SB07) and one off site (GW05).
  - Concentrations of PFAS exceeded human health guidelines in one onsite location sample (SB09\_0.0\_0.1).
  - PAH recreational exceedances were reported in sediment sample SS02.

Leachability testing confirmed that PFAS impacted soils and sediments have the potential to release PFAS to the environment at concentrations exceeding the nominated screening levels.

All off-site sediment samples reported detects of PFAS. This indicates that PFAS is likely to be migrating off-site via the surface water drainage pathways.

- Analysis of the groundwater samples collected during the GME indicated the following:
  - Heavy metal exceedances were reported at various monitoring locations on and offsite.
  - The highest value of PFAS contamination on-site is from the surface water retention pond in the north-eastern corner of the fire training ground.
  - PFAS was detected in all the surface water drainage lines leading from the retention pond.
  - PFAS is detected down gradient in Albion Creek and its unnamed tributary adjacent Poplar Avenue.
  - Levels of PFAS in surface water decrease with increasing distance from site.
  - Concentrations of PFAS in a surface water sample near the discharge point of Albion Creek to Lake Illawarra exceeded ecological guidelines.
- A conceptual site model has been developed for the site and it is considered that complete or potentially complete exposure pathways between PFAS contamination and identified receptors are present.
- Based on the EnRisk (2016) decision tree process for prioritisation, the site is currently classified as a priority 1 site based on detections of PFAS in surface water on site and at the site boundary at concentrations exceeding trigger value 1. It is important to note that the trigger point system has not been designed to be protective of all risks to people or the environment but is designed to assist with prioritisation of sites for further assessment and management.
  - The highest value of PFAS contamination on-site is from the surface water retention pond in the north-eastern corner of the fire training ground.
  - PFAS was detected in all the surface water drainage lines leading from the retention pond.
  - PFAS is detected down gradient in Albion Creek and its unnamed tributary adjacent Poplar Avenue.
  - Levels of PFAS in surface water decrease with increasing distance from site.
  - Concentrations of PFAS in a surface water sample near the discharge point of Albion Creek to Lake Illawarra exceeded ecological guidelines.

- A conceptual site model has been developed for the site and it is considered that complete or potentially complete exposure pathways between PFAS contamination and identified receptors are present.
- Based on the EnRisk (2016) decision tree process for prioritisation, the site is currently classified as a priority 1 site based on detections of PFAS in surface water on site and at the site boundary at concentrations exceeding trigger value 1. It is important to note that the trigger point system has not been designed to be protective of all risks to people or the environment but is designed to assist with prioritisation of sites for further assessment and management.

Based on these conclusions, and in conjunction with the limitations set out in Section 11 and the assumptions contained throughout the report, the following recommendations are made:

- A residential survey of water use be conducted to better characterise groundwater and surface water use down gradient of the FRNSW site.
- Consideration of immediate management actions which can be implemented to address the mass of PFAS present on site and minimise further migration. These management actions may include, but not be limited to:
  - Assess and implement measures to stop the retention basin on the FRNSW site overflowing, and restrict access/use of the water currently in this dam.
  - Sediment trap on the centralised pit to stop the transport of sediment leaving the site.
  - Removal of impacted soils around the fire training ground on the FRNSW site to remove the primary source zone
- Additional sampling should be undertaken following the implementation of any management actions. Sampling should be undertaken to accommodate seasonal fluctuation and, for example, following rainfall events to enable assessment of the areas where surface water collects from the ponds.
- Additional investigation to assess whether impacted groundwater is migrating off-site towards other potential abstraction points down gradient of the site. Data collected during the additional stage of investigations should include re-sampling of all surface and groundwater bore locations to validate the initial data set owing to the discrepancy reported by the laboratory.
- Risk assessment to evaluate risks to the identified receptors in the CSM.



# Glossary

Abbreviation	Description
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEXN	Benzene, toluene, ethylbenzene, xylenes and naphthalene
COC	Chain of custody
COPC	Contaminants of potential concern
CSM	Conceptual site model
DBYD	Dial Before You Dig
DO	Dissolved oxygen
DQI	Data quality indicator
DQO	Data quality objective
DTW	Depth to water
EC	Electrical conductivity
EIL	Ecological Investigation Level
EPA	NSW Environment Protection Authority
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
GIL	Groundwater Investigation Level
GME	Groundwater monitoring event
GPR	Ground penetrating radar
HIL	Health Investigation Level
HSL	Health Screening Level
JSEA	Job Safety Environmental Analysis
LOR	Limit of reporting
mAHD	metres Australian Height Datum
m bgl	Metres below ground level
mbTOC	Metres below top of casing
mg/L	Milligrams per litre
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
PID	Photo-ionisation detector
QA/ QC	Quality assurance/ quality control
REDOX	Oxidation-reduction potential
RPD	Relative Percent Difference
SFOP	Standard field operating procedures
SPR	Source pathway receptor

Abbreviation	Description
SWL	Standing water level
TOC	Top of casing
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
µg/L	Micrograms per litre
UPSS	Underground Petroleum Storage System
USCS	Unified Soil Classification System

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**Appendix I** – Slug test data



# 1. Introduction

GHD Pty Ltd (GHD) was engaged by Fire and Rescue NSW (FRNSW) to provide environmental assessment services (the Project) for a land parcel identified within Lot 10 DP 1157377 located at Airport Road, Albion Park Rail NSW 2527.

The site has previously been used for the training of firefighters, which has potentially included the use of aqueous film forming foams (AFFF). The foams used may have contained perfluoro alkyl substances (PFASs) including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

A preliminary site investigation (PSI) was undertaken by GHD in 2016 to identify potential sources of contamination and areas of potential concern and develop a sampling and analytical plan for further intrusive investigations on the site. The findings of the PSI are reported in:

- GHD (2016) *Albion Park PFAS Investigation, Preliminary Site Investigation and Sampling and Analysis Quality Plan*. Draft report, August 2016.

This report documents the outcomes of intrusive site investigations undertaken as part of the second stage of works on the site. For full details on the site history, reference is made to GHD 2016.

## 1.1 Background

The site is owned by Shellharbour City Council and the site is currently leased by FRNSW for use as a firefighting training facility. The surrounding land use includes the Illawarra airport located to the west and south of the site and the Rural Fire Service (RFS) located to the north of the site followed by vacant lot. To the west is a small area of bushland followed by Hargraves Avenue and residential properties.

GHD understands the use of AFFF and other firefighting foams potentially containing PFASs were used at a number of FRNSW locations in NSW for firefighting training purposes. For this reason, PFAS may have been released to the environment, which may have resulted in contamination.

The NSW Environmental Protection Authority (NSW EPA) is currently undertaking an investigation program to assess the historical legacy of PFAS use across NSW. As part of this program they have identified impact in surface water down gradient of the site and have requested further investigation to understand potential contamination issues be undertaken by FRNSW.

The site is approximately 15 000 m<sup>2</sup> and comprises part of Lot 10 LP 1157377. The approximate site boundaries are presented in Figure 1, Appendix A.

## 1.2 Objective

The overall objective of the investigation is to characterise impacts and subsequently assess the potential risks to human health and the environment from historical firefighting training activities at the site.

## 1.3 Scope

The scope of work comprised:

- A desktop review of available information including geological/hydrogeological map sheets, aerial imagery, site plans and any reports on previous environmental investigations provided by Fire and Rescue NSW (if available)
- Preparation of a project wide Health, Safety and Environment Plan (HSEP) and site specific Job Safety and Environmental Analysis (JSEA)
- Service location including a review of site plans (where available), dial before you dig (DBYD) plans, and scanning using ground penetrating radar to identify the presence of underground services
- Drilling and installation of five groundwater monitoring wells including two on-site locations (GW01 and GW02) and three off-site locations (GW03 to GW05).
- A groundwater monitoring event (GME) including slug testing of five groundwater wells.
- Collection of five surface water samples (SW01 to SW05) and five sediment samples (SS01 to SS05)
- Laboratory analysis of selected soil, sediment, surface water and groundwater samples for chemicals of potential concern (COPC) including
  - PFAS, total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals. total organic carbon (TOC), total iron, potassium, aluminium, silicon in selected soil and sediment samples
  - PFAS, TRH, BTEXN, PAH and heavy metals (standard laboratory limit of reporting), major ions and total dissolved solids (TDS) in groundwater and surface water samples
- Laboratory analysis of a selection of soil samples for Australian standard leaching procedure (ASLP) and toxicity characteristics leaching procedure (TCLP)
- Laboratory analysis of a retrieved section of asphalt for PFAS
- A quality control and quality assurance (QA/QC) program
- Preparation of this environmental site assessment report ( this report)
- Surveying of newly installed wells.

## **1.4 Limitations**

This report is subject to the limitations provided in Section 11.



## 2. Site description

### 2.1 Site identification

A summary of site identification details is provided in Table 2-1. The site location is presented in Figure 1 in Appendix A.

**Table 2-1 Site identification summary**

Item	Description
Street Address	Airport Road, Albion Park Rail NSW 2527
Lot and DP number	Part of Lot 10, DP 1157377
Site Area	Approximately 15,000 m <sup>2</sup> (1 ha), with a perimeter of approximately 1 km
Local Government Area	Shellharbour City Council
Current Land Use	Fire Training site for FRNSW stations around the area to use.
Ownership	Land parcel owned by Shellharbour City Council. Site leased by FRNSW for use as a training facility. The site has been occupied by FRNSW since 1997.

### 2.2 Surrounding land use and zoning

The surrounding land uses are summarised below in Table 2-2.

**Table 2-2 Description of surrounding land use and respective zonings**

Orientation	Description of Surrounding Land Use	Zoning (North Sydney Council LEP 2013)
North	Illawarra Rural Fire Services compound and vacant land beyond	IN1 – General Industrial
East	Vegetation identified as Environmentally Sensitive Land in the Terrestrial Biodiversity Map from the Shellharbour City Council Online Mapping system. Residential properties beyond.	E3 – Environmental management
South	Boomerang Avenue immediately followed by an airport hangar and Illawarra Regional Airport beyond.	SP1 – Special Activities: Air Transport Facility
West	Airport Road and Illawarra Regional Airport beyond.	SP1 – Special Activities: Air Transport Facility

### 2.3 Site environmental setting

#### 2.3.1 Topography

The site has an elevation of approximately 6 m above Australian Height Datum (m AHD), according to Survey data collected as part of the current scope of works. The natural ground level across the investigation area is relatively flat.

The regional topography appears to rise to the north, west and south and fall towards Lake Illawarra approximately 650 m east of site.

## 2.3.2 Soils

### General

According to eSPADE from Office of Environment & Heritage, the site is within the Fairy Meadow 'fa' landscape. The Fair Meadow soil landscape has the following characteristics:

- **Landscape:** Alluvial plains, floodplains, valley flats and terraces below the Illawarra Escarpment. Local Relief <10 m. Slopes usually <5%. Almost completely cleared low open-forest and woodland.
- **Soils:** moderately deep (50-100 cm). Alluvial Loams and Siliceous Sands on terraces. Prairie Soils and Yellow Podzolic Soils occur on the drainage plains.
- **Limitations:** flood hazard, low wet bearing strength, highly permeable topsoils, high water tables.

### Acid Sulfate Soils

The acid sulfate soil class at the site has a low probability of occurrence and at depths greater than 3 metres below the ground surface (reference from the Department of Land and Water Conservation, Albion Park, Acid Sulfate Soil risk map, Edition 2, 1997).

The site is situated in AP4 (alluvial plains elevation of >4 m AHD). Around the stormwater channel located to the north of the site there is a zone of AP2 (*low probability depths of 2 meters below ground surface*) and AP1 (*high probability at depths of 1 metre below ground surface*) which means the chance of encountering acid sulfate soils increases at these areas.

## 2.3.3 Hydrology

Surface water flow is expected to follow the local topography on site and flow towards the north-east. Dial before you dig underground utilities information did not provide an indication of stormwater infrastructure through the site. However, it appeared during the site visit that the majority of onsite drainage flowed into the retention pond in the north-eastern corner of the site.

Stormwater grates are located within the asphalted training area and larger concrete drains are located around the site. All underground stormwater pipes potentially drain into a centralised pit, located in the north eastern corner of the site, before leaving the site. The predicted underground flow of the site and where the surface water is draining to is presented in Figure 2, Appendix A.

The only surface water on site is the retention pond located in the north-eastern corner of the site. The pond has the potential to overflow during heavy rainfall periods due to the site and surrounding area being low lying in elevation. This overflow could potentially go offsite to the grassed area immediately east of the site or the grated pit (stormwater) in the north eastern corner of the site.

The nearest surface water feature is Albion Creek, located approximately 420 m north of the site, which discharges in Lake Illawarra 650 m north-east of site. The general catchment hydrology and slope is presented in Figure 3, Appendix A.

## 2.3.4 Geology

The 1:250,000 geological map series for Wollongong (Department of Mines, 1966) suggests that the regional geology of the area is Berry Formation. This lithology is part of the Permian Shoalhaven Group that is characteristic of siltstone, shale and sandstone, including lenticular development of the Megalong Conglomerate.

### 2.3.5 Hydrogeology

#### Existing Groundwater Bores

A groundwater bore search was completed by GHD on 6 February 2017. A review of the Department of Primary Industries *All Groundwater Data Map*, indicates that there no registered bores within a 500 m radius of the site. The nearest bore is located approximately 1.1 km south-west of site. The bore is a private bore and the intended use is stock, domestic. This well was installed to 30 m with the water bearing zone located around 20 m bgl. Appendix D show the groundwater database record for the bore and the location in regards to the site. This aquifer is a deeper aquifer than the one targeted on-site.

#### Groundwater risk map

The *1:2,000,000 Groundwater in New South Wales, Assessment of Pollution Risk Map* indicates the site is likely to be underlain by sandstone in sedimentary basins, which potentially have low hydraulic conductivities. Groundwater salinity is expected to range from 0 – 1000 mg/L, which is suitable for stock, domestic and some irrigation purposes.

### 2.3.6 Surface water and drainage

#### On-site surface water features

Surface water bodies relevant to the site include:

- On-site surface water retention pond located in the north-eastern corner of the site, receiving onsite surface water drained through a variety of manmade drains.

#### Off-site surface water features

Hydraulically down gradient of the site (north to north-east), surface water appears to flow into a subsurface drainage culvert that extends north-east towards Hargraves Avenue, eventually draining into an unnamed tributary of Albion Creek, located approximately 420 m north of the investigation area. Albion Creek discharges in Lake Illawarra approximately 650 m east of site.

The general catchment hydrology and slope is presented in Figure 3, Appendix A.

## 2.4 Site layout and key site features

A site inspection was undertaken initially by GHD in June 2016. Observations made during the site inspection are presented in GHD (2016). Table 2-4 provides a summary of site details including site layout and key site features.

Item	Summary Observations
Fencing and access	The general layout of the site comprises a main cyclone fence which encompasses the FRNSW property (part of Lot 10, LP 1157377) identified as 'the site' for the purpose of this investigation. The site is secure access, for authorised entry only. This boundary is presented in Figure 2, Appendix A.
FRNSW site features	Key features of the area occupied by FRNSW include: <ul style="list-style-type: none"><li>- Administration buildings and site offices.</li><li>- Main fire training area located to the south of the main driveway to the site. The fire training area was primarily covered with asphalt and GHD understands that the area has not been re-surfaced for at least five years.</li></ul>

Item	Summary Observations
	<ul style="list-style-type: none"> <li>- A surface water retention pond, receiving water draining from the fire training area.</li> </ul>
Key features of the broader property	<p>Key features of the broader land parcel, outside of the FRNSW fenced area, include:</p> <ul style="list-style-type: none"> <li>- NSW Rural Fire Service located to the north of the FRNSW site and Illawarra airport located to the west and south of the site.</li> </ul>

### 3. Data Quality Objectives

The Data Quality Objectives (DQOs) for the investigation are based on guidance presented in:

- NEPC (2013) *National Environmental Protection (Assessment of Site Contamination) Amended Measure (NEPM) No. 1 – Schedule B1, Guideline on Investigation Levels for Soil and Groundwater.*

The DQOs establish a framework for contamination investigations which incorporates a seven stepped continuum that defines the problem at the site. A series of stages then optimises the design of the investigation. The seven steps are outlined below:

- Step 1: State the Problem
- Step 2: Identify the Principal Study Question
- Step 3: Inputs to the Decision
- Step 4: Boundaries of the Study
- Step 5: Decision Rules
- Step 6: Tolerable Limits on Decision Errors
- Step 7: Optimisation of the Data Collection Process

An overview of the DQOs for the investigation are presented in the following steps.

#### Step 1: State the problem

The site has previously been used for the training of firefighters, which has potentially included the use of aqueous film forming foams (AFFF). The AFFF used may have contained PFAS including (PFOS) and perfluorooctanoic acid (PFOA), which are potentially harmful to human health and the environment.

Given the short shelf life, storage of AFFF was reportedly limited on site and instead, the product was reportedly brought onto site for specific training purposes as required. 20L containers of AFFF concentrate were reportedly brought to site and mixed for immediate use in training exercises.

The problem as it stands is that the use of AFFF containing PFAS may have resulted in contamination of soil, surface water, groundwater and sediments both on site and surrounding land.

#### Step 2: Identify the decision/goal of the study

The key study questions to be answered as part of the works is:

- Are contaminants present on the site at concentrations which pose a potentially unacceptable risk to human health or the environment under the current land use (training facility) and adjacent land-uses (including rural residential land use)?
- Is the data obtained of an acceptable quality to enable appropriate conclusions to be made in relation to the overall risks to human health and/ or the environment?

Should contamination present at the site pose a potentially unacceptable risk to human health for the current land uses or the environment based on concentrations of PFAS in soils, sediments, groundwater or surface waters, the other decisions to be made are:

- Is the extent of the impact adequately delineated?
- Is further assessment or remediation/management required?

### Step 3: Identify the information inputs

The following inputs are required for the decision:

- The location of potential PFAS contamination sources
- The concentrations of PFAS in soil, sediment, groundwater and surface water from laboratory analysis.
- Identify potential exposure routes and contamination migration pathways.
- The likelihood of PFAS migrating to groundwater and subsequently off-site.

### Step 4: Define the boundaries of the study

Boundaries of the investigation are summarised in Table 3-1.

**Table 3-1 Investigation boundaries**

Boundary	Definition
Spatial boundaries	The spatial boundaries for the investigation area are identified as the lateral extent of the sampling locations as shown in Figure 4, Appendix A and down to a depth of approximately 6.6 m bgl, which is the maximum intrusive investigation depth.
Temporal boundaries	The timeframe for this investigation's scope of work primarily defined to the period of works undertaken in the investigation area as part of this assessment; namely June (initial site investigation) to December 2016.
Scale of decision making	The scale of the decision making is limited to the boundaries of the investigation area and identified off-site receptors
Potential constraints on data collection	Locations SB14, SB15 and GW05 had to be moved due to the airport antennas in the area having an exclusion zone.

### Step 5: Decision rules

The degree of impact by contaminants and the decisions associated with accepting data will be assessed with reference to the chosen site investigation levels, which were established within the framework of guidelines made or approved by the NSW EPA.

The criteria used for screening analytical results are discussed in Section 5.

The decision rule was considered to be:

- If concentrations of the COPC in soil, sediment, surface water, or groundwater on or off-site exceed the adopted criteria for permissible land use(s) (as per current zoning), then further assessment, remediation and/or management may be required.
- Conversely, no further action may be required in the event that concentrations are below adopted site criteria.

### Step 6: Tolerable limits on decision errors

Data generated during this investigation must be appropriate to allow decisions to be made with confidence.

Specific limits for this investigation have been adopted in accordance with the appropriate guidance from the AS4482.1, which includes appropriate indicators of data quality (data quality indicators [DQIs] used to assess QA/QC, and GHD's Standard Field Operating Procedures). The pre-determined DQIs established for the investigation are discussed in Appendix G.

If any of the DQIs are not met, further investigation will be necessary to determine whether the non-conformance will significantly affect the usefulness of the data.

## **Step 7: Optimisation of the data collection process**

This step involves identifying the most resource effective sampling and analysis design which is required to satisfy the DQOs. The sampling and analysis plan which was developed to meet this objective is summarised in Section 4.



# 4. Methodology

## 4.1 General

The scope of work is summarised in Section 1.3. The tables in Section 4.2 to 4.5, summarise the groundwater well installation and soil sampling, sediment sampling, groundwater sampling and surface water sampling methodologies.

## 4.2 Groundwater well installation and soil sampling Soil bore sampling

**Table 4-1 Soil bore sampling methodology**

Item	Description
Date of fieldwork	5 - 8 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	National Uniform Drillers Licensing Committee (2011) Minimum Construction Requirements for Water Bores in Australia (Edition 3, 2012)
Ground clearance	Scanning using electromagnetic locating prior to mechanical drilling.
Drilling technique	Following hand auguring, solid flight augers were employed to refusal, followed by air hammer.
Bore logging	All field observations and subsurface conditions were recorded on borehole logs (Appendix F).
Field screening	Field screening for volatiles was undertaken prior to collection of soil samples for laboratory analysis using a PID, the results of which are included in Appendix E. PID calibration data is presented in Appendix E.
Soil sampling	Discrete soil samples were collected from the surface and from each lithological zone. Samples for VOC screening were collected in separate snap lock bags. Additionally, soil was sampled into laboratory supplied jars.
Sample Analysis	Two soil samples from each borehole were submitted for laboratory analysis of COPC including PFAS, TRH, BTEXN, PAH, 8 heavy metals, total organic carbon (TOC), total iron, potassium, aluminium, silicon.
Sample handling and transport	Following collection, soil samples were immediately placed on ice and stored in a cool, dark environment (esky) prior to being forwarded to the analytical laboratory within the specified holding times along with a chain of custody (COC) form (Appendix H).
QA/QC	A QA/QC sampling procedure was implemented and further details are described in Section 3 and Appendix G. QA/QC sampling included one intra-laboratory duplicate sample, one inter laboratory duplicate sample, four field rinsates, two trip blanks and three trip spikes..
Well construction	Wells were installed with the following general characteristics: <ul style="list-style-type: none"> <li>- 50 mm polyvinyl chloride (PVC) Class 18 blank and screened casings</li> <li>- Primary filter pack material comprising a chemically inert material which was well rounded, with a high coefficient of uniformity and extended at least 0.5 m above the screened PVC casing</li> <li>- Bentonite pellets used as annular sealant which extended at least 0.5 m above the filter pack, followed by a cement slurry to the ground surface</li> </ul>

Item	Description
	<ul style="list-style-type: none"> <li>- Monitoring wells were finished with trafficable gatic covers and concrete</li> </ul>
Development	<p>Well development occurred following installation using bailers until:</p> <ul style="list-style-type: none"> <li>- No further noticeable sand or silt was recovered</li> <li>- The water was relatively clear when removed from the well</li> <li>- All water was removed from the well</li> </ul>
Surveying	<p>Following well installation, all newly installed were surveyed by a registered surveyor. The survey report for the wells is provided in Appendix C.</p>
Waste disposal	<p>Soil cuttings and purged groundwater was transferred to three 205 L drums on site and are pending transfer to a to a licenced waste facility. Waste disposal documentation will be provided in the Stage 2 report.</p>

### 4.3 Sediment sampling

**Table 4-2 Sediment sampling methodology**

Item	Description
Date of fieldwork	16 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	GHD's Standard Field Operating Procedures
Sampling	Samples were collected by hand using a trowel and were placed directly into laboratory supplied sample jars.
Sample handling and transport	Following collection, sediment samples were immediately placed on ice and stored in a cool, dark environment (esky) prior to being forwarded to the analytical laboratory within the specified holding times along with a COC form (Appendix H).
Decontamination	<p>Prior to and following the collection of each groundwater sample, all non-disposable sampling equipment underwent decontamination including:</p> <p>Washing of equipment with phosphate-free detergent (Decon Neutracon)</p> <ul style="list-style-type: none"> <li>• Rinsing of equipment with fresh water</li> </ul>
Sample analysis	All sediment samples were submitted for laboratory analysis of COPC including PFAS, TRH, BTEXN, PAH, 8 heavy metals, total organic carbon (TOC), total iron, potassium, aluminium, silicon.
QA/QC	QA/QC sampling included one intra-laboratory duplicate sample.

## 4.4 Groundwater sampling

**Table 4-3 Groundwater sampling methodology**

Item	Description
Date of fieldwork	15 and 16 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	<p>ASTM D6771–02, Standard practice for low-flow purging and sampling for wells and devices used for groundwater quality investigations, ASTM International</p> <p>Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998)</p> <p>Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwaters (AS 566.11:1998)</p>
Gauging	Two on-site monitoring wells (GW01 and GW02) and three off-site monitoring wells (GW03, GW04 and GW05) were gauged using an oil/water interface probe to measure standing water levels (SWL) and assess for the potential presence of light non-aqueous phase liquid (LNAPL). LNAPL was not encountered, therefore no LNAPL sampling was required.
Field chemistry	<p>Field measurements were taken using a calibrated water quality meter and flow through cell, with measurements of temperature, pH, electrical conductivity (EC), dissolved oxygen (DO) and oxidation-reduction potential (REDOX) recorded.</p> <p>Field sampling sheets are presented in Appendix E.</p>
Sampling	All five monitoring wells were purged using a submersible pump within 24 hours of sampling as part of a slug test. The water column in each of the wells during the time of sampling is considered to be representative of the underlying aquifer.
Sample handling and transport	Following collection, samples for heavy metal analysis were filtered through a 0.45um filter before being placed in the sample bottles. The groundwater samples were then immediately placed on ice and stored in a cool, dark environment (esky) prior to being forwarded to the analytical laboratory within the specified holding times along with a COC form (Appendix H).
Decontamination	<p>Prior to and following the collection of each groundwater sample, all non-disposable sampling equipment underwent decontamination including:</p> <ul style="list-style-type: none"> <li>• Washing of equipment with phosphate-free detergent (Decon Neutracon)</li> <li>• Rinsing of equipment with fresh water</li> </ul>
Sample analysis	All groundwater samples (five) were submitted for laboratory analysis of COPC including PFAS, TRH, BTEXN, PAH and eight heavy metals (standard laboratory limit of reporting), major ions, alkalinity, pH and total dissolved solids (TDS).

Item	Description
	Laboratory results are summarised in Appendix B and certificates of analysis and COC included in Appendix H.
QA/QC	QA/QC sampling included the collection of one intra-laboratory duplicate sample.
Waste disposal	Waste drums are pending transfer to a licenced waste facility and will occur after the Stage 2 field works.

## 4.5 Surface water sampling

**Table 4-4 Surface water sampling methodology**

Item	Description
Date of fieldwork	16 December 2016
Work clearance	JSEA including daily pre-work assessment and hazard identification
Technical guideline	GHD's Standard Field Operating Procedures
Field chemistry	Field parameters temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), reduction-oxidation potential (redox) and temperature of the surface water were also recorded at each sample point using a water quality meter placed directly into a bucket of water from the water body. Field sampling sheets are presented in Appendix E.
Sampling	Surface water samples were collected from locations close to the water's edge using a hand held water sampler fitted with a laboratory provided plastic unpreserved container that was changed between locations.
Sample handling and transport	The surface water samples were then transferred into laboratory provided bottles. Samples for heavy metal analysis were filtered through a 0.45um filter before being placed in the sample bottles. The sample bottles were transferred to an ice filled cool box for sample preservation prior to and during shipment to the sampling laboratory. A chain of custody form was completed, and forwarded with the samples to the testing laboratory.
Decontamination	Dedicated sample bottles were used to collect surface water samples, eliminating the need for decontamination of equipment and rinsate samples.
Sample analysis	All surface water samples were submitted for laboratory analysis of COPC including PFAS, TRH, BTEXN, PAHs, metals (8), TDS and major ions.
QA/QC	QA/QC sampling included the collection of one intra-laboratory duplicate sample.
Waste disposal	No excess surface water was collected during surface water sampling.

## 5. Assessment criteria

### 5.1 Basis for assessment

The following guidelines were adopted for the assessment of contamination.

- NSW EPA (1995) *Contaminated Sites: Sampling Design Guidelines*
- NSW DEC (2006) *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*
- NSW DECC (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*
- NSW EPA (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*
- NEPM (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No. 1)*, National Environment Protection Council (NEPC)

Screening criteria for the assessment of PFAS impacted sites are still in the process of development in Australia. Only a few values have been published by Australian regulatory agencies, some of which are interim, draft or are “to be reviewed”. GHD is involved with the development of National guidelines for the assessment and management of PFAS contamination which has included drafting of the guidelines for a working group organised by CRC CARE and involving State and Commonwealth regulatory agencies and organisations.

In addition to works undertaken by GHD, published guideline documents currently available and considered as part of this review include:

- Department of Environment Regulation (DER), January 2017. *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, Contaminated Sites Guidelines, Government of Western Australia (WA).
- Department of Environment and Energy (DEE), October 2016. *DRAFT Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFAS)*
- EnHealth, June 2016. *Interim national guidance on human health reference values for per- and poly-fluoroalkyl substances for use in site investigations in Australia.*
- Environmental Risk Sciences Pty Ltd, February 2016. *Proposed Decision Tree for Prioritising Sites Potentially Contaminated with PFASs, New South Wales Environment Protection Authority (NSW EPA)*

For the purpose of the assessment of data collected as part of these investigations, a number of guidelines and information sources have been reviewed in order to identify the most appropriate and current site assessment criteria at the time of preparation of this report. GHD notes that these criteria differ slightly to those initially outlined in the SAQP presented in GHD (2016) as new documentation has come to light since the preparation of the PSI (GHD, 2016). The screening criteria documented herein supersede any criteria previously specified in the PSI.

It is noted that the assessment of PFAS impacted sites is a rapidly developing field and consequently site assessment criteria are continually under review and may be revised as new scientific information becomes known.

## 5.2 Rationale for assessment criteria

The assessment criteria were selected to allow decisions to be made for the following identified receptors (from Section 2.2):

- On-site (FRNSW) and off-site commercial workers associated with the council yards and RFS.
- Off-site hydraulically down-gradient residential receptors north of the site.
- Recreational users of surface waters down hydraulic gradient from the site
- Beneficial uses of groundwater, including domestic groundwater resources and ecological receptors in surface water bodies recharged by groundwater
- Environmentally sensitive land offsite to the east of site.

## 5.3 Nominated PFAS assessment criteria

### 5.3.1 Surface water and groundwater

To assess the potential contamination risk to the adjacent ecosystem, the WA DER (2017) interim screening levels are adopted for the surface water and groundwater assessment. The nominated screening levels are outlined in Table 5-1.

**Table 5-1 Nominated screening criteria for surface water and groundwater**

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
Drinking water quality	0.5 µg/L	5 µg/L	Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. Drinking water is not extracted on site and no registered groundwater bores were located in a 1 km radius of the site. However, the potential for localised use of groundwater for domestic or stock purposes cannot be discounted and as such drinking water criteria are considered for the purpose of this initial screening.
Ecological – freshwater*	0.00023 µg/L	19 µg/L	Criteria adopted from DER (2017) freshwater criteria for high conservation value systems (99% species protection). The draft guidelines recommend that the 99% level of protection is used for slightly to moderately disturbed systems as PFAS and PFOA have been shown to bio accumulate in wildlife.
Recreational water	5 µg/L (sum of PFOS and PFHxS)	50 µg/L	Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. The closest water body to the site is Albion Creek, located approximately 430 metres north of the site, which discharges into Lake Illawarra, approximately 650 metres north-east of the site. Lake Illawarra is used for recreational activities and fishing purposes.

Note: \* Lake Illawarra is classified as a marine ecosystem; however marine criteria have not yet been published for PFOS/PFHxS or PFOA. In this context freshwater guidelines have been considered.

### 5.3.2 Soil and sediment

Most of the currently available PFAS guidelines are based on direct contact with contaminated soils, however, as PFAS is highly soluble in water, and can be washed through soil into underlying groundwater or discharged into river systems, the leaching potential of the PFAS in soil should be the focus of an initial assessment (NSW EPA, 2016).

To assess the potential contamination risk to human health, the WA DER (2017) interim screening levels are adopted for the soil assessment. There are no published guidelines available for the assessment of ecological risk, therefore the Department of the Environment and Energy (DEE) draft 'Commonwealth Environmental Management Guidance on Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA)' were considered. These DEE draft guidelines have been considered as a comparative screening tool only, not as an action level or similar. The guideline screening values from Table 1 (developed for CRC Care through the application of Australia's ASC NEPM methodology) were used considering a separate water assessment has been included in the scope of works for this site.

In accordance to the NSW EPA guideline, the ASLP criteria for soil/sediment leachate assessment were the surface water/groundwater criteria multiplied by a dilution factor of 10. A dilution factor of 20 is recommended by the USEPA as the minimum dilution that is likely to occur as a chemical move from soil into underlying groundwater, using a dilution factor of 10 provides some additional conservatism (NSW EPA, 2016).

The nominated screening criteria for the assessment of leachable concentrations of PFOS and PFOA from soils are presented in Table 5-2.

**Table 5-2 Nominated screening criteria for soil - leachate**

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
Drinking water quality	5 µg/L	50 µg/L	Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. Dilution factor of 10 applied
Ecological – marine*	0.0023 µg/L	190 µg/L	Criteria adopted from DER (2017) freshwater criteria for high conservation value systems (99% species protection). Dilution factor of 10 applied
Recreational water	50 µg/L (sum of PFOS and PFHxS)	500 µg/L	Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. Dilution factor of 10 applied

Note: Lake Illawarra is classified as a marine ecosystem; however marine criteria have not yet been established for PFOS/PFHxS or PFOA. In this context freshwater guidelines have been considered.

Health and ecological based screening levels to be applied to the assessment of soil and sediment data are summarised in Table 5-3.

**Table 5-3 Nominated screening criteria for soil and sediment**

Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
<b>Health Based</b>			
Residential	4 mg/kg (sum of PFOS and PFHxS)	40 mg/kg	Criteria adopted from DER (2017). Guideline values are based on interim tolerable daily intake value of 0.15 µg/kg/d for PFOS/PFHxS and 1.5 µg/kg/d for PFOA.
Commercial / industrial	100 mg/kg (sum of PFOS and PFHxS)	1000 mg/kg	Criteria adopted from DER (2017). Guideline values are based on interim tolerable daily intake value of 0.15 µg/kg/d for PFOS/PFHxS and 1.5 µg/kg/d for PFOA.



Exposure Scenario	PFOS / PFHxS	PFOA	Basis for nomination of criteria
<b>Ecological based</b>			
Sensitive ecological vegetation	6.6 mg/kg	1 mg/kg	Published guideline values unavailable at the time of preparation of this report. Draft guideline value derived DEE (2016) – used as a comparative tool only.

## 5.4 Assessment criteria –other CoPCs

### 5.4.1 Soil and sediment

The assessment of risk to human health, was undertaken in accordance with NEPC 2013. The following criteria have been adopted:

- NEPC (2013) Health investigation level (HIL)-D and Health screening level (HSL) D; for on-site commercial/industrial land uses
- NEPC (2013) Health investigation level (HIL)-C and Health screening level (HSL) C; for off-site open space land use
- CRC Care direct contact HSL-C for off-site open space use
- CRC Care direct contact HSL-D for on-site commercial/industrial land use
- CRC Care direct contact and HSL vapour intrusion for intrusive maintenance works on and off-site
- NEPC (2013) Ecological investigation level (EILs) D / ESL-D; for on-site commercial/industrial land uses
- NEPC (2013) Ecological investigation level (EILs) and Ecological screening level (ESL) Urban Residential/Public open space for off-site rural residential land uses

HSL guidelines take into account the sub-surface material and have different guidelines for sand, silt and clay at varying depths. Based on the soil samples HSLs for SAND have been adopted for this site.

The adopted soil criteria are presented in Table A1 and Table A2 in Appendix B. If the nominated assessment guidelines do not provide screening values for the analytes shown in the summary tables, the guideline was removed from the summary table.

All sediment samples collected in this investigation were considered to be classified as 'soil'. Specific sediment based guidelines (ANZECC 2000, Interim-sediment quality guidelines, high and low) were reviewed and compared to the adopted soil assessment criteria, which were found to be more conservative and no change to the investigation results were identified. Therefore considering this and the physical nature of the samples, no sediment specific assessment criteria were adopted for the assessment of these samples.

### 5.4.2 Groundwater investigation levels

In accordance with NSW EPA (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*, contaminants identified in groundwater have been screened against existing generic groundwater investigation levels (GILs) which protect the following environmental values:

- Drinking water

- Aquatic ecosystems

The groundwater investigation levels (GILs) presented in NEPC 2013 are based on ANZECC 2000 and NHMRC 2011. These criteria are considered to be protective of the environmental and drinking water values referenced by NSW EPA (2007). On the basis that groundwater could discharge to a marine water system (Lake Illawarra, located approximately 650 m north-east of the site), NEPM GILs for marine waters have been adopted.

The National Health Medical Research Council (NHMRC) recreational guidelines have also been adopted to account for potential use of groundwater for recreation use off-site.

The HSLs presented in NEPC 2013 are based on CRC CARE 2011 and HSL D commercial/industrial (vapour intrusion for sand soils, 2-4 m) have been adopted for this investigation.

CRC Care groundwater HSLs for vapour intrusion to intrusive maintenance workers (vapour intrusion for sand soils, 2-4 m) were included in this investigation. However, GHD notes that these guidelines are non-limiting for all analytes.

# 6. Results

## 6.1 General

This section presents the results of all soil, groundwater, sediment and surface water investigations undertaken on the site by GHD in December 2016.

Analytical results and groundwater / surface water field parameters are summarised in the following tables in Appendix B:

- Table A1: Soil analytical results: Human health
- Table A2: Soil analytical results: Ecological and intrusive maintenance workers
- Table A3: Sediment analytical results: Human Health
- Table A4: Sediment analytical results: Ecological
- Table B: ASLP analytical results
- Table C: Groundwater and surface water analytical results and field parameters

## 6.2 Quality assurance and quality control

An evaluation of the field and laboratory data quality was undertaken in accordance with the NEPM – Schedule B2, Assessment of data quality.

Laboratory report ES1629123 was re-analysed for the full PFAS suite and the results were reported under a new laboratory report ES1701791. The two reports showed a number of large discrepancies with respect to the analytical data reported at the same locations. In all instances, data reported from the second analyses for the full PFAS suite (laboratory report ES1701791) was higher than the original results, in some samples by an order of magnitude. As a result of these discrepancies, the laboratory run duplicate analysis on selected samples and confirmed that the results from the second laboratory report ES1701791 were correct. For the purpose of these investigations, GHD has accepted the data reported in laboratory report ES1701791 (the most conservative data set) and PFAS results from laboratory report ES1629123 have not been discussed further in this report.

Overall, the review of the QA/QC program indicates that the soil, groundwater, surface water and sediment analytical data are of an acceptable quality upon which to draw meaningful conclusions regarding impacts to groundwater and soil at the site.

## 6.3 Soil results

Soil was examined by GHD during drilling works at newly installed groundwater wells (GW01 to GW05) and soil bores (SB6 to SB15). Descriptions of the site lithology including visual and olfactory observations, sample identifications along with the well construction details and elevations are presented in borehole logs contained in Appendix F.

### 6.3.1 Soil profile

The observed lithology at across the 15 soil sampling locations is summarised in Table 6-1.

**Table 6-1 Generalised lithology encountered**

Depth range (m)	Lithology
0.0 – 0.6	Silty SAND (fill)
0.6 – 5.0	CLAY pale grey mottled brown (alluvial)

Depth range (m)	Lithology
5.0 – 6.6	Gravelly and or sandy CLAY (alluvial)

### 6.3.2 Soil analytical results

Soil samples were collected from 10 soil bores (SB06 to SB15) and five monitoring wells (GW01 to GW05) installed at various locations on and off site. Five soil bores (SB06 to SB10) and two groundwater wells (GW01 and GW02) were installed within the FR NSW compound. Soil bores SB11 to SB15 and monitoring wells GW03, GW04 and GW05 were installed in the area surrounding the site. The soil laboratory results are presented in Figure 6 in Appendix A and Tables A1 and A2, Appendix B. Laboratory certificates of analysis are presented in Appendix H.

#### PFAS summary results

PFAS concentrations in soil were generally low with concentrations of the sum of PFOS and PFHxS generally two to three orders of magnitude below the relevant screening levels with the following exceptions:

- SB06\_0.5-0.6, reporting a total sum PFOS + PFHxS concentration of 3.73 mg/kg.
- SB09\_0-0.1, reporting a total sum PFOS +PFHxS concentration of 4.21 mg/kg.

In both instances, these samples were collected on site and as such reference to the commercial land use criteria protective of human health (100 mg/kg) was considered and no exceedance of this value was identified.

Detectible concentrations of PFOS + PFHxS concentration were reported in the soil analyses from asphalt sample SB07\_ASHPALT\_0.0\_0.3 (0.0146 mg/kg) albeit below the adopted guidelines.

In all instances, concentrations of PFOS and PFOA were below the nominated draft ecological screening criteria of 6.6 mg/kg and 1 mg/kg respectively.

#### Other COPCs

Soil COPCs reported in excess of the nominated screening criteria are summarised in Table 6-2. Further comment pertaining to these exceedances is provided in Section 7.

**Table 6-2 Summary soil exceedances**

Analyte	Exceedance type	Location
Copper	NEPM 2013 EIL-Commercial/Industrial	Soil – SB07_0.5_0.6 (143 mg/kg)
	NEPM 2013 EIL-Urban Residential- Public Open Space	Soil – SB08_0.0_0.15 (64 mg/kg) (duplicate) and SB07_0.5_0.6 (143 mg/kg)
Zinc	NEPM 2013 EIL-Commercial/Industrial	Soil – GW05_1.6_1.7 (278 mg/kg)
	NEPM 2013 EIL-Urban Residential- Public Open Space	

All samples were also analysed for TRH, BTEX and PAH and the concentrations of these analytes were near or below the detection limit of the laboratory and nominated screening levels protective of human health and ecological receptors under the relevant land use scenario.

### 6.3.1 Leachate –ASLP

A total of 16 soil samples were submitted for ASLP to assess the leaching potential of PFAS from site soils (GW01\_0-0.2, GW02\_0.5-0.6, GW03\_0-0.1, GW04\_0.5-0.6, GW05\_1.6-1.7, SB06\_5.0-5.1, SB07\_3.0-3.1, SB08\_0.5-0.6, SB09\_4.0-4.1, SB10\_0-0.1, SB12\_0-0.1, SB13\_0.5-0.6, SB14\_0.5-0.6 and SB15\_1.0-1.1). The leachate laboratory results are presented

in Table B, Appendix B and shown on Figure 7, Appendix A. Laboratory certificates of analysis are presented in Appendix H.

The results indicate elevated levels of PFAS leaching from the soils, in particular locations SB06\_0.5-0.6 and SB09\_0.0-0.1, corresponding with sampling locations reporting the maximum total PFOS + PFHxS concentrations in soil.

PFAS leachate reported in excess of the nominated screening criteria are summarised in Table 6-3. Further comment pertaining to the relevance of this data is provided in Section 7.

**Table 6-3 PFAs ASLP exceedances**

Analyte	Exceedance type	Location
PFHxS and PFOS (Sum of Total)	NEPM GIL ecological, freshwater	Detection level exceedance in all samples
	NEPM GIL, drinking water	GW03_0.0-0.1 (76.9 ug/L), SB06_0.5-0.6 (192 ug/L), SB06_5.0-5.1 (10.8 ug/L), SB08_0.5-0.6 (21.5 ug/L), SB09_0.0-0.1 (550 ug/L), SB09_4.0-4.1 (10.7 ug/L) and SB10_0.0-0.1 (11.5 ug/L)
	NHMRC recreational	GW03_0.0-0.1 (76.9 ug/L), SB06_0.5-0.6 (192 ug/L) and SB09_0.0-0.1 (550 ug/L)

## 6.4 Sediment results

### 6.4.1 Analytical results

Sediment samples were collected at locations SS01 to SS05. The sediment laboratory results presented in Figure 6 in Appendix A and Table A3 and A4, Appendix B. Laboratory certificates of analysis are presented in Appendix H.

There were no exceedances of the nominated screening criteria for sediment.

Excluding SS03 and SS05, concentrations of PFAS in sediments were low and generally below or close to the laboratory limit of reporting. In the absence of current screening criteria for PFAS in sediments, the DER (2017) screening criteria for soils have been applied. Given the location and profile of the samples collected the application of soil screening criteria for initial analysis of the data set is considered appropriate for this investigation.

The maximum concentrations reported for PFOS and PFOA in sediments were 0.186 mg/kg and 0.0051 mg/kg respectively. All PFAS concentrations were several orders of magnitude below the nominated investigation levels, however still represent a potential on-going source of PFAS to surface water receptors.

## 6.5 Groundwater and surface water results

### 6.5.1 Groundwater gauging results

Gauging results are summarised in Table 6-4. The top of casing (TOC) elevation was determined by a professional surveyor and was used to calculate the groundwater elevation in metres Australian Height Datum (AHD).

**Table 6-4 Groundwater Gauging Data**

Well ID	Depth of well (m)	Depth to groundwater (m bTOC)	TOC (m AHD)	Corrected groundwater elevation (m AHD)
GW01	6.304	3.296	6.170	2.874
GW02	6.660	3.350	6.293	2.943

Well ID	Depth of well (m)	Depth to groundwater (m bTOC)	TOC (m AHD)	Corrected groundwater elevation (m AHD)
GW03	6.395	2.721	5.398	2.677
GW04	6.045	2.610	5.036	2.426
GW05	6.20	2.815	4.814	1.999

Note: TOC = top of casing

A groundwater contour map showing the interpolated groundwater contours and the inferred groundwater flow direction is presented on Figure 8 in Appendix A. Groundwater contours were calculated based on groundwater elevations using an inbuilt ArcGIS interpolation tool to derive the contours with a kriging method.

The local groundwater flow was inferred to be in a north to north-easterly direction.

### 6.5.2 Groundwater quality

Prior to groundwater sample collection, field parameters and observations were recorded during the purging of the well. Field parameters for the site are summarised in Table 6-5.

**Table 6-5 Summary of water quality field parameters**

Parameter	Results and Comments
pH	pH range was 3.75 (GW04) and 6.04 (GW01)
Temp (°C)	Temperature was between 18.3°C (GW03) and 19.4°C (GW01)
EC (µS/cm)	EC ranged between 10,004 µS/cm (GW01) and 16,983 µS/cm (GW04)
DO (mg/L)	DO ranged between 1.81 mg/L (GW03) and 6.24 mg/L (GW01)
ORP* (mV)	Field redox ranged between 73.6 mV and 283.5 mV

\* Oxidation Reduction Potential

### 6.5.3 Analytical results

Groundwater samples were collected from two onsite wells; GW01 and GW02 and three offsite monitoring wells; GW03, GW04 and GW05. Surface water samples were collected from four offsite locations; SW01, SW02, SW03, SW04 and one on-site location; SW05. The groundwater and surface water laboratory results presented in Figure 5 in Appendix A and Table C, Appendix B. Laboratory certificates of analysis are presented in Appendix H.

Groundwater and surface water COPC reported in excess of the nominated screening criteria are summarised in Table 6-6. Further discussion pertaining to these exceedances is provided in Section 7.

**Table 6-6 Summary groundwater and surface water exceedances**

Analyte	Exceedance type	Monitoring location
Sum PFHxS and PFOS	NEPM GIL ecological, marine water (inclusive of WA DER PFAS criterion)	All surface water and groundwater locations exceeded this criteria. Maximum concentrations at SW05 (162 ug/L).
	NEPM GIL, drinking water (inclusive of WA DER PFAS criterion)	Surface water – SW01, SW03 and SW05. Maximum concentration at SW05 (162 ug/L). Groundwater – GWQA3 (GW01) and GW03. Maximum concentration at GW03 (46.5 ug/L).
	NHMRC recreational (inclusive of WA DER PFAS criterion)	Surface water – SW05 (162 ug/L) Groundwater - GW03 (46.5 ug/L)

Analyte	Exceedance type	Monitoring location
PFOA	NEPM GIL ecological, marine water (inclusive of WA DER PFAS criterion)	Surface water –SW05 (9.13 ug/L).
Arsenic	NEPM GIL, drinking water	Groundwater - GW04 (0.018 ug/L)
Copper	NEPM GIL ecological, marine water	Surface water - SW01, SW02 and SW03. Maximum concentrations at SW02 (0.006 ug/L) Groundwater – GW02, GW04 and GW05. Maximum concentrations at GW04 (0.052 ug/L)
Lead	NEPM GIL ecological, marine water	Groundwater – GW02 and GW04 (0.004 ug/L and 0.007 ug/L, respectively).
Nickel	NEPM GIL, drinking water	Groundwater – GW01, GW02, GW03, GW04 and GW05. Maximum concentrations at GW04 (0.323 ug/L).
	NHMRC Recreational	Groundwater – GW04 (0.323 ug/L)
Zinc	NEPM GIL ecological, marine water	Surface water – SW04 (0.01 ug/L) Groundwater - GW01, GW02, GW03, GW04 and GW05. Maximum concentrations at GW04 (0.744 ug/L).

Concentrations of TRH and PAH were below detection levels for majority of sampled analysed. No exceedances were reported.

## 6.6 Slug test results

Location	Bouwer-Rice – Low (m/day)	Bouwer-Rice – High (m/day)	Bouwer – Rice – Mean (m/day)
GW01	0.018	0.029	0.024
GW02	0.020	0.070	0.045
GW03	0.032	0.123	0.078
GW04	0.005	0.010	0.008
GW05	0.023	0.043	0.033

In December 2016, GHD conducted groundwater hydraulic conductivity testing including short term single well pumping tests to characterise the hydraulic conductivity (k) of the aquifer encountered beneath the site. The testing was undertaken at five locations (GW01, GW02, GW03, GW04 and GW05). These monitoring location were installed within the alluvial floodplain clays surrounding Lake Illawarra.

The data was processed with the AQTESOLV Pro software (HydroSOLVE Inc, 1996-2007) using the Theis (recovery) analytical solution. The analytical outputs from AQTESOLV are provided in Appendix I.

The results indicated that the hydraulic conductivity ranged from <0.01 m/day to 0.078 m/day and are in the literature range of a clay to silt aquifer (Weight and Sondregger, 2000).



# 7. Discussion

## 7.1 PFAS Contamination status

### 7.1.1 Soil and sediment

#### *On-site*

No soil and sediment samples exceeded the adopted PFAS screening criteria for both human health and ecological receptors based on a direct contact scenario. The concentration of PFAS in soils and sediments were low with the results generally being less than the LOR and/or several orders of magnitude below the nominated investigation levels under commercial/industrial land use scenarios.

Soil samples SB06\_0.5-0.6 and SB09\_0.0-0.1 reported the highest concentrations of PFAS. These samples were collected to the north and south of the fire training ground respectively, in an area which has historically and is currently used for firefighting training purposes.

The one on-site sediment sample (SS05) reported detectable concentrations of PFAS and the concentrations were the highest at this location.

The results of the soil and sediment sampling confirm that the areas of firefighting training that are known to have used AFFF containing PFAS remain impacted, albeit at concentrations below screening criteria adopted for the protection of human health and ecological receptors based on a direct contact or ingestion scenario. The presence of PFAS impact in soils however remains, and the potential for on-going release to the environment can not be discounted and is discussed further below.

#### *Off-site*

No off-site soil bores reported detects of PFAS. However, all off-site sediment samples report detections of PFAS excluding SB11. This indicates that PFAS is likely to be migrating off-site via the surface water drainage pathways.

Vegetation identified as environmentally sensitive land is located immediately east of the site. Soil bores (SB11, SB12 and SB13) were carried out within this area and detections of PFAs were reported in concentrations several orders of magnitude below the adopted sensitive ecological guidelines. GHD acknowledges these values are draft and are considered in the context of the boarder site setting and potential source pathway receptor linkages.

The concentration of PFAS in off-site sediment samples was comparable with sediment samples from with-in the FRNSW site and wider training facility, suggesting that attenuation of PFAS within the drainage lines is limited.

All off-site sediment samples, excluding SS02, contained detectible concentrations of PFAS. Levels of PFAs were highest in sediments collected from SS03 located in Albion Creek near Princes Hwy. No exceedances of the adopted criteria were reported. The concentration of PFAS in off-site sediment samples was comparable with the on-site sediment sample, suggesting that attenuation of PFAS within the drainage lines is limited.

#### *PFAS leachability from soils*

The most important process by which PFASs present in soil may pose a risk to people or the environment is contamination of surface and groundwater's from leaching from the soil (NSW EnRisk, 2016)



Despite the low concentration of PFAS in all soil and sediment samples, leachate testing completed on a number of these samples shows that there is potential for the release of PFAS to groundwater and surface water environments and the presence of PFAS in soils represents a likely on-going source to the environment.

All soil samples analysed for leachate potential (ASLP) exceeded the nominated leachability screening criteria adapted from WA DER (2017) ecological freshwater guidelines suggesting that the impacted soils both on and off site may continue to pose a risk to ecological aquatic receptors. The concentration of PFHxS and PFOS (sum of total) from shallow samples at GW03, SB06, SB08, SB09 and SB10 and deeper samples at SB06 and SB09 were noted to also exceed the leachability screening criteria adapted from the WA DER (2017) Drinking water guidelines. GW03, SB06 and SB09 shallow samples exceeded the adapted WA DER (2017) recreational guidelines. Each of these locations are also associated with the main training area on and just off-site the FRNSW site. Based on the findings of this preliminary stage of assessment, this area is considered likely to be a primary source zone of ongoing PFAS contamination to surface water and groundwater receptors.

### **7.1.2 Groundwater**

Groundwater contours indicate that the groundwater is flowing generally to the north to north-east towards Lake Illawarra. This aligns with the expected groundwater flow from the regional topography, geology and hydrogeology outlined in Section 2.3.

Concentrations of PFAs have been detected in groundwater both on and off-site. The highest concentration and inferred source of PFAS contamination on-site is from the surface water retention pond in the north-eastern corner of the fire training ground. PFAS was detected in all the surface water drainage lines leading from the retention pond. Once off-site, PFAS is detected down gradient in Albion Creek and its unnamed tributary adjacent Poplar Avenue. Levels of PFAS in surface water decrease with increasing distance from site. The lowest concentrations of PFAS were reported in the sample (SW02) collected the Illawarra Airport stormwater canal situated north of the site and up gradient of Albion Creek. Considering the highly mobile and soluble nature of PFAS this may suggest that AFFF use has been limited to the Fire and Rescue compound.

Drinking water exceedances of PFAS are reported in groundwater adjacent the retention pond and down gradient surface waters. Considering that groundwater flow direction is to the north-east towards Lake Illawarra, groundwater conditions down gradient of the source zone remain un-delineated. However, the exposure pathway of groundwater being abstracted for potable and or domestic purposes is not considered likely as no registered groundwater abstraction bores are located within 1 km of the site and that there is the availability of local mains water supply.

As a conservative measure GHD has adopted the DER (2017) fresh water ecology criteria (99% species protection level) and for surface water assessment levels for recreational use. DER states that the bio accumulative properties of PFAS are reason enough to use the draft ANZECC trigger levels for the protection of 99% of species.

The nearest surface water body and significant ecological receptor is Lake Illawarra located approximately 650 m north-east of site. Concentrations of PFAS within a surface water sample collected near the discharge point of Albion Creek to Lake Illawarra reported a detection level exceedance of ecological guidelines. GHD acknowledges that the 99% ecological guideline is below the quantifiable limit of reporting however, the current approach by ANZECC on the use of guideline value recommends moving away from relying solely on chemical concentrations for managing water quality and encourages a more integrated approach.

## 7.2 Prioritisation

EnRisk (2016) presents a decision tree process and trigger points to enable prioritisation of sites based on the findings of investigation. Trigger points for soil leachate, surface water and groundwater as reported by EnRisk (2016), are summarised below with reference to the analytical data collected during this preliminary stage of assessment.

### *Soil leachate data*

- Trigger point 1: Soil leachate data reported above 100 µg/L<sup>1</sup>
- Trigger point 2: Soil leachate data reported above 1 µg/L

The maximum total PFAS concentration reported for soil leachate data was 550 µg/L collected from SB09\_0.0-0.1, classifying the site as a 'Priority 1 site' under the EnRisk (2016) decision tree process based on soil leachate data.

### *Groundwater and surface water data*

- Trigger point 1 (elevated contamination): Groundwater or surface water data reported above 10 µg/L<sup>2</sup>
- Trigger point 2: Groundwater or surface water data reported between 0.1 µg/L to 10 µg/L
- Trigger point 3 (low levels of contamination): Groundwater or surface water data reported between 0.05 µg/L to 0.1 µg/L

The maximum total PFAS concentration reported for surface water was 162 µg/L in SW05 collected from the retention pond located adjacent to the fire training area. Based on review of the surface water data, the site would be classified as a priority 1 site (where on-site surface water results are above trigger point 1).

Total PFAS concentrations in groundwater on site range between 0.1 to 46.5 µg/L with the highest off-site sample reporting a concentration of 46.5 µg/L. Under the EnRisk (2016) decision tree process, the site would be classified as priority 1.

### *Prioritisation of the site*

As outlined above, soil leachate, surface water and groundwater analytical data would classify the site as a priority 1 site for further investigation based on the data reported both on and off site.

The conclusions and recommendations made in Section 9 of this report take into account this prioritisation.

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<sup>1</sup> Trigger points values can be applied to PFOS alone or to the sum of PFAS as discussed by EnRisk (2016)

<sup>2</sup> Trigger points values can be applied to PFOS alone or to the sum of PFAS as discussed by EnRisk (2016)

## 8. Conceptual site model

It is noted that the primary objective of this investigation is to assess the historical impacts from fire training activities. While other minor sources of contamination have been identified, based on our review, firefighting training activities are the key issue of concern for the site. The primary contaminants of potential concern (COPC) are therefore PFAS, notably PFOS and PFOA, which were components of AFFF. The CSM concentrates primarily on PFAS as the main COPC for the site and is the key driver for any additional work at the site.

Based on the sampling analytical results, the conceptual site model from the PSI (GHD, 2016) has been refined. The potential source-pathway-receptor linkages are summarised below (Table 8-1).

### 8.1.1 Sources

The site is currently occupied by FRNSW and is used by staff as office space, meeting areas for crewing staff, storage and fire training. AFFF containing PFAS are no longer used at the site.

Based on the findings of the PSI (GHD, 2016) and the results of intrusive investigations undertaken to date, the following primary sources of contamination and associated COPC have been identified:

- The site has historically been used as a firefighting training site for approximately 20 years.
- Potential source areas include:
  - The concrete pad and asphalt surface in the north eastern area of site, where most AFFF and fuel for ignition are likely to have been used.
  - The retention pond in the north eastern area of site which showed elevated PFOS concentration after EPA sampling.
  - The grassed area immediately off-site where overflow of the retention pond would occur.
  - All other areas of the site where different fire training scenarios have historically taken place. Based on discussions with site personnel, the historical use of AFFF in these areas cannot be discounted.
  - Minor spills of petroleum hydrocarbons and oils from vehicles traversing the asphalt surfaces within the investigation area.

Impacted soils and sediments which have migrated from the main source zones (including to off-site locations), with subsequent leaching of PFAS, represent a secondary source of contamination.

Other potential historical COPC included TRH, BTEX and PAHs from fire accelerants and motor oils from vehicles (historic and current). However, analytical results for these compounds were generally low or below the LOR in soil, sediment, surface water and groundwater samples indicating that they are unlikely to be an ongoing source of contamination.

### 8.1.2 PFAS fate and transport

PFAS forms a component of AFFF which is sprayed onto fires during training events. The mode of use of AFFF through roof monitors and hoses allows for it to spread through airborne dispersion beyond the training area. Typically, this results in diffuse low levels of PFAS over a wider area. Generally, the highest soil concentrations tend to be at the point source.

PFAS are stable and persistent compounds that do not readily degrade in the environment.

Once in soil, PFAS can leach from soil to water (due to its solubility in water) as water migrates downward through soil to the water table, resulting in contaminated groundwater. Generally, the shorter chain PFAS species are more soluble than the longer chain PFAS. Groundwater will migrate and discharge into the nearest down-gradient surface water body – in the case of the site the main discharge area is likely to be Lake Illawarra 650 m east of site, as well as through stormwater drainage to Albion Creek which drains to Lake Illawarra. Lake Illawarra is used commercially for recreational activities and fishing purposes.

If the groundwater in the area is shallow, groundwater and PFAS may 'daylight' during high rainfall events and result in overland flow to surface drains and creeks.

Studies have indicated that as fresh water contacts sea water, PFAS's can partition into sediments suggesting a significant mass of dissolved phase PFAS's may partition into the sediment rather than become dissolved in sea water (You et al 2010, Zhang and Lerner 2012). This, combined with tidal effects, makes the discharge mechanisms in coastal regions very complex. Benthic organisms living in the sediment may then be impacted through ingestion of the sediments.

Migration through the soil will depend on the attenuation properties of the soil. Some components of the soil (notably organic carbon) can sorb PFAS components. Generally, the longer chain PFAS species will sorb more readily. This, combined with the lower solubility of the longer PFAS species, can result in mainly shorter chain PFAS species being dissolved in water while the large molecules remain in the soil.

The surface water on-site collects in the stormwater pit in the north eastern corner of the site. This then connects to the stormwater pipe that meets Albion Creek 400 m north of the site. The main surface water receptors considered to be Lake Illawarra located approximately.

Plants (including aquatic plants) have the ability to uptake PFAS in through impacted soil water. Grasses and other flora can be consumed by micro- and macro-fauna which may in turn be predated.

The main risks to human health mainly arise through ingestion of impacted media i.e. soil, water or organisms.

In terms of risks to ecological receptors, while contamination can give rise to direct toxic effects on ecosystems, the limiting factor can be the bioaccumulation of contaminants in fish or other species affecting persons or other animals that consume these fish or other species.

### **8.1.3 Receptors**

When evaluating potential adverse health / environmental effects from exposure to a contaminated site, all potentially exposed populations should be considered. For this site, the key populations or receptors of interest are considered to include:

- Current and future onsite workers.
- Current and future construction/intrusive maintenance (utility) workers (on-site and off-site).
- Residential properties down gradient of the site.
- Users of off-site water bodies for recreational and fishing purposes.
- Users of groundwater. GHD understands that groundwater is not extracted at the site for any purpose suggesting this may be a low risk. However, the potential for extraction remains both on-site and off-site.
- Aquatic ecological receptors – invertebrates, molluscs, fish, eels etc.

- Terrestrial ecological receptors – local invertebrates (worms, insects etc), mammals, birds, reptiles that might consume impacted animals, plants and surface water.

#### 8.1.4 Exposure pathways

The primary pathways by which receptors could be exposed to the sources of contamination outlined above are considered to be:

- Dermal contact with contaminated soil, surface water and groundwater.
- Incidental ingestion of contaminated soils, surface water and groundwater.
- Ingestion of groundwater and impacted plant and animal material.
- Terrestrial animal consumption of impacted animals, water, soils and plants.
- Inhalation of contaminated soils or dust and water (aquatic animals). (PFAS are not considered to be a vapour hazard due to its low volatility).
- Extraction and use of groundwater.
- Surface runoff and sediment transport into storm water drainage and subsequent transport and discharge to surface waters. This may be enhanced during significant rain events and flooding.
- Inhalation of contaminated soils or dust.
- Vertical and horizontal migration of contaminated liquid through the unsaturated zone into the saturated zone, and subsequent horizontal migration within the groundwater and subsequent discharge to surface waters. The US EPA (2014) notes that PFAS are water soluble and can migrate readily from soil to groundwater, where they can be transported long distances.

#### 8.1.5 Potential source-pathway-receptor linkages

Based on the current information, the following preliminary CSM has been developed for potential on site sources of contamination in Table 8-1 below and presented in **Figure 9, Appendix A**.

**Table 8-1 Updated CSM**

Potential Source	Primary pathway	Receptor	Pathway present?
Soils in firefighting training areas	Dermal contact	FRNSW and wider training facility commercial workers	Unlikely – PFAS impact detected in shallow soil samples from this area (SB06, GW03 and SB09) however impact below adopted assessment criteria
		Intrusive maintenance workers	Unlikely – PFAS impact detected in shallow soil samples from this area (SB06, GW03 and SB09) however impact below adopted assessment criteria
	Vertical/horizontal migration of leachate through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes – PFAS impact in GW03 and GW04, down gradient of training facility
	Surface runoff and sediment transport	Surface waters (including drainage systems –	Yes – PFAS detected in sediment samples from surface waters and drainage lines associated with this area.

Potential Source	Primary pathway	Receptor	Pathway present?
		secondary pathway)	
		Off-site open space	Yes – sediment samples along drainage line contain PFAS
		Off-site ecological	Yes – off-site surface water indicate PFAS impact above ecological screening criteria, which is likely to be associated with the FRNSW site
Surface water retention basin	Dermal contact and ingestion	FRNSW and wider training facility commercial workers	Possible – PFAS impact present greater than drinking water and recreational criterion at SW01, SW03, SW05.
	Vertical/horizontal migration of water through unsaturated zone	Groundwater – subsequent migration in groundwater (secondary)	Yes - PFAS impact in GW03, GW04 and GW05, down gradient of training facility.
		Down gradient surface waters	Yes – Albion Creek and at the outlet to Koono Bay down gradient report PFAS impact
Surface Water off-site – Albion Creek and Lake Illawarra	Dermal contact and ingestion	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koono Bay down gradient report PFAS impact
	Down gradient ecological receptors	Down gradient surface waters	Yes – Albion Creek and at the outlet to Koono Bay down gradient report PFAS impact
Contaminated groundwater	Vertical/horizontal migration	Down gradient surface waters recharged by groundwater	Yes – GW03 and GW04 have PFAS impact above adopted assessment criteria off-site.
		Abstraction bores (stock and/or domestic use)	Unlikely – There are no known user of groundwater down gradient of the site.
Soils impacted by fire accelerants and motor oils from vehicles (historic and current, TRH, BTEX and PAH)	Dermal contact and ingestion and/or	FRNSW and wider training facility commercial workers, intrusive maintenance workers and/or groundwater	No – the majority of samples below the LOR and all samples below the adopted assessment criteria for each assessed receptor.
	Inhalation of vapours and/or		
	Vertical/horizontal migration through unsaturated zone		

It is noted that SW05 exceeds the recreational guidelines for PFHxS and PFOS. The location of the sample point is within the retention pond located within the secure Fire and Rescue compound. A recreational scenario is not applicable to this location and the likelihood of a human coming into accidental contact with this water is highly unlikely.

# 9. Conclusions and recommendations

## 9.1 Conclusions

The overall objective of this investigation is to characterise impacts and subsequently assess the potential risks to human health and the environment from historical firefighting training activities (specifically those involving PFAS) in the FRNSW site and wider training facility area. Based on the scope of works presented in Section 1.3 of this report, the findings of the investigation and subject to the limitations presented in Section 11, the following conclusions are made:

- The subsurface investigations encountered silty sand fill underlain by alluvial clay to a maximum investigation depth of 6.6 m bgl.
- Standing water levels in on-site wells were recorded to be between 2.61 m btoc (GW04) and 3.35 m btoc (GW02). The general groundwater flow direction was inferred to be towards the north-east.
- Analysis of the soil and sediment samples indicated the following:
  - Heavy metal ecological exceedances were reported at two locations on site (SB08 and SB07) and one off site (GW05).
  - Concentrations of PFAS exceeded human health guidelines in one onsite location sample (SB09\_0.0\_0.1).
  - PAH recreational exceedances were reported in sediment sample SS02.

Leachability testing confirmed that PFAS impacted soils and sediments have the potential to release PFAS to the environment at concentrations exceeding the nominated screening levels.

All off-site sediment samples reported detects of PFAS. This indicates that PFAS is likely to be migrating off-site via the surface water drainage pathways.

- Analysis of the groundwater samples collected during the GME indicated the following:
  - Heavy metal exceedances were reported at various monitoring locations on and offsite.
  - The highest value of PFAS contamination on-site is from the surface water retention pond in the north-eastern corner of the fire training ground.
  - PFAS was detected in all the surface water drainage lines leading from the retention pond.
  - PFAS is detected down gradient in Albion Creek and its unnamed tributary adjacent Poplar Avenue.
  - Levels of PFAS in surface water decrease with increasing distance from site.
  - Concentrations of PFAS in a surface water sample near the discharge point of Albion Creek to Lake Illawarra exceeded ecological guidelines.
- A conceptual site model has been developed for the site and it is considered that complete or potentially complete exposure pathways between PFAS contamination and identified receptors are present.
- Based on the EnRisk (2016) decision tree process for prioritisation, the site is currently classified as a priority 1 site based on detections of PFAS in surface water on site and at the site boundary at concentrations exceeding trigger value 1. It is important to note that the trigger point system has not been designed to be protective of all risks to people or



the environment but is designed to assist with prioritisation of sites for further assessment and management.

## 9.2 Recommendations

Based on the findings of these works, the following recommendations are made:

- A residential survey of water use be conducted to better characterise groundwater and surface water use down gradient of the FRNSW site.
- Consideration of immediate management actions which can be implemented to address the mass of PFAS present on site and minimise further migration. These management actions may include, but not be limited to:
  - Assess and implement measures to stop the retention basin on the FRNSW site overflowing, and restrict access/use of the water currently in this dam.
  - Sediment trap on the centralised pit to stop the transport of sediment leaving the site.
  - Removal of impacted soils around the fire training ground on the FRNSW site to remove the primary source zone
- Additional sampling should be undertaken following the implementation of any management actions. Sampling should be undertaken to accommodate seasonal fluctuation and, for example, following rainfall events to enable assessment of the areas where surface water collects from the ponds.
- Additional investigation to assess whether impacted groundwater is migrating off-site towards other potential abstraction points down gradient of the site. Data collected during the additional stage of investigations should include re-sampling of all surface and groundwater bore locations to validate the initial data set owing to the discrepancy reported by the laboratory.
- Risk assessment to evaluate risks to the identified receptors in the CSM.



# 10. References

ANZECC (2000). National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000, Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

AS4482 (1999 and 2005). Guide to the investigation and sampling of sites with potentially contaminated soil.

AS/NZS5567.11 (1998). Water Quality – Sampling – Guidance on the sampling of groundwater.

AS/NZS 5567.1 (1998). Water Quality – Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.

ASRIS (2013) Australian Soil Resource Information System, 2013

CRC Care (2011) Friebel, E and Nadebaum, P 2011, *Health screening levels for petroleum hydrocarbons in soil and Groundwater. Summary*, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

Department of Mines (1966) *1:250,000 Geological Series Sheet S1 56-9, Wollongong 2<sup>nd</sup> Edition*. NSW Department of Mines, Sydney, NSW

Department of Water Resources (1987) *Groundwater in New South Wales: Assessment of Pollution Risk*. Department of Water Resources, Sydney, NSW

Department of Environment Regulation (DER), January 2017. *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, Contaminated Sites Guidelines, Government of Western Australia (WA).

Department of Environment and Energy (DEE), October 2016. DRAFT *Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFAS)*

DER (2016); *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS), Contaminated Site Guidelines*; WA Department of Environment Regulations Perth, Western Australia.

National Health and Medical Research Council (NHMRC), 2008; *Guidelines for Managing Risks in Recreational Water*, Australian Government, Canberra.

NSW EPA (2016), *Fire & Rescue NSW Firefighting Training Site – Airport Road, Albion Park*. DOC 16/107497. Dated 26 February 2016

NSW Department of Primary Industries, Office of Water, groundwater map, accessed on 20 February 2017, available at: <http://allwaterdata.water.nsw.gov.au/water.stm>

NUDLC, 2011 National Uniform Drillers Licensing Committee *Minimum Construction Requirements for Water Bores in Australia*, Australian Government National Water Commission.

NEPM, 2013; *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No.1)*, National Environment Protection Council (NEPC)

NSW DEC, 2006; *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*

NSW DECC, 2009; *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*

NSW EPA, 1995; *Contaminated Sites: Sampling Design Guidelines*

Office of Environment and Heritage (OEH), 2011; *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*

Shellharbour Local Environmental Plan 2013

UK Environmental Agency, 2009; *Review of human health and environmental risks associated with land application of mechanical – biological treatment outputs (Revision 1) Report SC030144/R5 Environment Agency*

US EPA, 2014; *Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA), Emerging Contaminants Fact Sheet – PFOS and PFOA*

US EPA, 2014a; *Health Effects Document for Perfluorooctanoic Acid (PFOA)*; US EPA Washington DC, United States.

US EPA, 2014b; *Health Effects Document for Perfluorooctane Sulfonate (PFOS)*; US EPA Washington DC, United States

# 11. Limitations

This report has been prepared by GHD for Fire & Rescue NSW and may only be used and relied on by Fire & Rescue NSW for the purpose agreed between GHD and the Fire & Rescue NSW as set out in this report.

GHD otherwise disclaims responsibility to any person other than Fire & Rescue NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described throughout this report. GHD disclaims liability arising from any of the assumptions being incorrect.

Where data supplied by Fire & Rescue NSW or other external sources, including previous site investigation data and site plans, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by GHD for incomplete or inaccurate data supplied by others.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

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 conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.



## **Appendices**

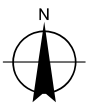
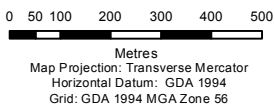
## **Appendix A** – Figures





**LEGEND**

- Site Boundary
- Streets
- Major Waterways
- Minor Waterways



Fire & Rescue NSW  
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**Site Location and Key  
Off-site Receptors**

**Figure 1**

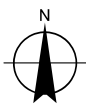
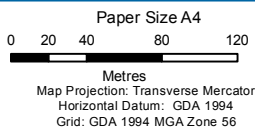




© Land and Property Information 2015

**LEGEND**

- Site Boundary
- Cadastre
- Environmentally Sensitive Land
- Streets
- Major Waterways
- Minor Waterways
- Inferred Surface Drainage (Aboveground)
- Inferred Surface Drainage (Underground)



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Site Layout

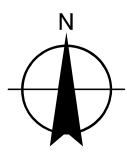
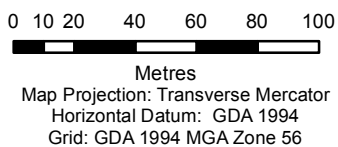
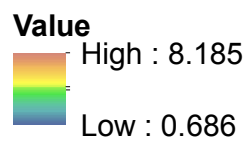
Figure 2





LEGEND

- Site Boundary
- Streets
- Contours
- Major Waterways
- Minor Waterways



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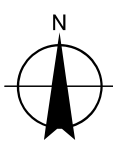
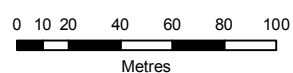
Elevation

Figure 3





- LEGEND**
- Site Boundary
  - Streets
  - Major Waterways
  - Minor Waterways
  - Inferred Surface Drainage (Aboveground)
  - Inferred Surface Drainage (Underground)
  - + Groundwater Monitoring Well (GHD, 2016) (5)
  - Soil Borehole (GHD, 2016) (10)
  - + Sediment Sample Location (GHD, 2016) (5)
  - Surface Water Sample Location (GHD, 2016) (5)



Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 56

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### Investigation Locations

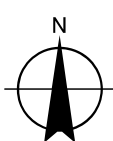
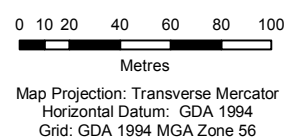
### Figure 4





Exceeds Drinking Water Guidelines  
 Exceeds NEPM 2013 Table 1C GILs, Marine Waters  
 Exceeds Recreational Guidelines

- LEGEND**
- Site Boundary
  - Streets
  - Major Waterways
  - Minor Waterways
  - Inferred Surface Drainage (Aboveground)
  - Inferred Surface Drainage (Underground)
  - + Groundwater Monitoring Well (GHD, 2016) (5)
  - Soil Borehole (GHD, 2016) (10)
  - ⊗ Sediment Sample Location (GHD, 2016) (5)
  - ⊙ Surface Water Sample Location (GHD, 2016) (5)



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## Groundwater and Surface Water Exceedances & PFAS Results

Figure 5





SS03 - Sediment (mg/kg)	
PFHxS and PFOS	0.115
PFOA	0.0006
PFAS (WA DER List)	0.116

SS04 - Sediment (mg/kg)	
PFHxS and PFOS	0.0015
PFOA	<0.0002
PFAS (WA DER List)	0.0015

GW05 - Soil Bore (mg/kg)		
Zinc	0.5-0.6	3.4-3.5
PFHxS and PFOS	278	27
PFOA	0.0036	<0.0002
PFAS (WA DER List)	0.0003	<0.0002
PFAS (WA DER List)	0.005	<0.0002

SS01 - Sediment (mg/kg)	
PFHxS and PFOS	0.0049
PFOA	<0.0002
PFAS (WA DER List)	0.0049

SS02 - Sediment (mg/kg)	
PFHxS and PFOS	<0.0002
PFOA	<0.0002
PFAS (WA DER List)	<0.0002

SB15 - Soil Bore (mg/kg)		
PFHxS and PFOS	1-1.1	5-5.1
PFOA	0.029	<0.0002
PFAS (WA DER List)	0.001	<0.0002
PFAS (WA DER List)	0.0357	<0.0002

SB09 - Soil Bore (mg/kg)		
PFHxS and PFOS	0-0.1	4-4.1
PFOA	4.21	0.0903
PFAS (WA DER List)	0.0671	0.0049
PFAS (WA DER List)	4.49	0.139

SB08 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	5-5.1
PFOA	0.138	0.0103
PFAS (WA DER List)	0.0019	0.0008
PFAS (WA DER List)	0.146	0.0211

SB07 - Soil Bore (mg/kg)		
Copper	0.5-0.6	3-3.1
PFHxS and PFOS	143	14
PFOA	0.0035	0.0037
PFAS (WA DER List)	<0.0002	<0.0002
PFAS (WA DER List)	0.005	0.004

GW02 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	5-5.1
PFOA	0.0603	0.002
PFAS (WA DER List)	0.0004	<0.0002
PFAS (WA DER List)	0.0667	0.002

GW01 - Soil Bore (mg/kg)		
PFHxS and PFOS	0-0.2	4-4.1
PFOA	0.0347	<0.0002
PFAS (WA DER List)	0.0018	<0.0002
PFAS (WA DER List)	0.0466	<0.0002

GW04 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	6-6.1
PFOA	0.0019	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002
PFAS (WA DER List)	0.0019	<0.0002

SB14 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	3-3.1
PFOA	0.0123	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002
PFAS (WA DER List)	0.0131	<0.0002

SB12 - Soil Bore (mg/kg)		
PFHxS and PFOS	0-0.1	5.6-5.7
PFOA	0.0163	<0.0002
PFAS (WA DER List)	0.0004	<0.0002
PFAS (WA DER List)	0.0297	<0.0002

GW03 - Soil Bore (mg/kg)		
PFHxS and PFOS	0-0.1	5-5.1
PFOA	0.816	0.0005
PFAS (WA DER List)	0.0243	<0.0002
PFAS (WA DER List)	0.907	0.001

SS05 - Sediment (mg/kg)	
PFHxS and PFOS	0.197
PFOA	0.0051
PFAS (WA DER List)	0.212

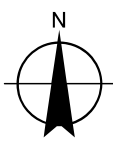
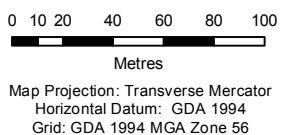
SB06 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	5-5.1
PFOA	3.73	0.0959
PFAS (WA DER List)	0.0599	0.0054
PFAS (WA DER List)	3.83	0.148

SB11 - Soil Bore (mg/kg)		
PFHxS and PFOS	1-1.1	5.4-5.5
PFOA	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002

SB10 - Soil Bore (mg/kg)		
PFHxS and PFOS	0-0.1	2.3-2.5
PFOA	0.146	0.0013
PFAS (WA DER List)	0.0097	<0.0002
PFAS (WA DER List)	0.185	0.0015

SB13 - Soil Bore (mg/kg)		
PFHxS and PFOS	0.5-0.6	2-2.1
PFOA	0.0068	<0.0002
PFAS (WA DER List)	<0.0002	<0.0002
PFAS (WA DER List)	0.0068	<0.0002

- LEGEND**
- Site Boundary
  - Streets
  - Major Waterways
  - Minor Waterways
  - Inferred Surface Drainage (Aboveground)
  - Inferred Surface Drainage (Underground)
  - + Groundwater Monitoring Well (GHD, 2016) (5)
  - Soil Borehole (GHD, 2016) (10)
  - + Sediment Sample Location (GHD, 2016) (5)
  - Surface Water Sample Location (GHD, 2016) (5)



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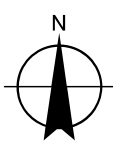
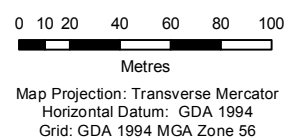
## Soil and Sediment Exceedances & PFAS Results

Figure 6





- LEGEND**
- Site Boundary
  - Streets
  - Major Waterways
  - Minor Waterways
  - Inferred Surface Drainage (Aboveground)
  - Inferred Surface Drainage (Underground)
  - + Groundwater Monitoring Well (GHD, 2016) (5)
  - Soil Borehole (GHD, 2016) (10)
  - + Sediment Sample Location (GHD, 2016) (5)
  - Surface Water Sample Location (GHD, 2016) (5)



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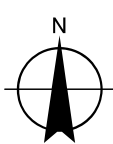
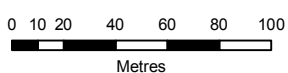
## ASLP Exceedances & PFAS Results

## Figure 7





- LEGEND**
- ▭ Site Boundary
  - Streets
  - Major Waterways
  - Minor Waterways
  - Inferred Surface Drainage (Aboveground)
  - - - Inferred Surface Drainage (Underground)
  - Groundwater Elevation Contours (mAHD)
  - + Groundwater Monitoring Well (GHD, 2016) (5)
  - Soil Borehole (GHD, 2016) (10)
  - + Sediment Sample Location (GHD, 2016) (5)
  - Surface Water Sample Location (GHD, 2016) (5)



Map Projection: Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 56

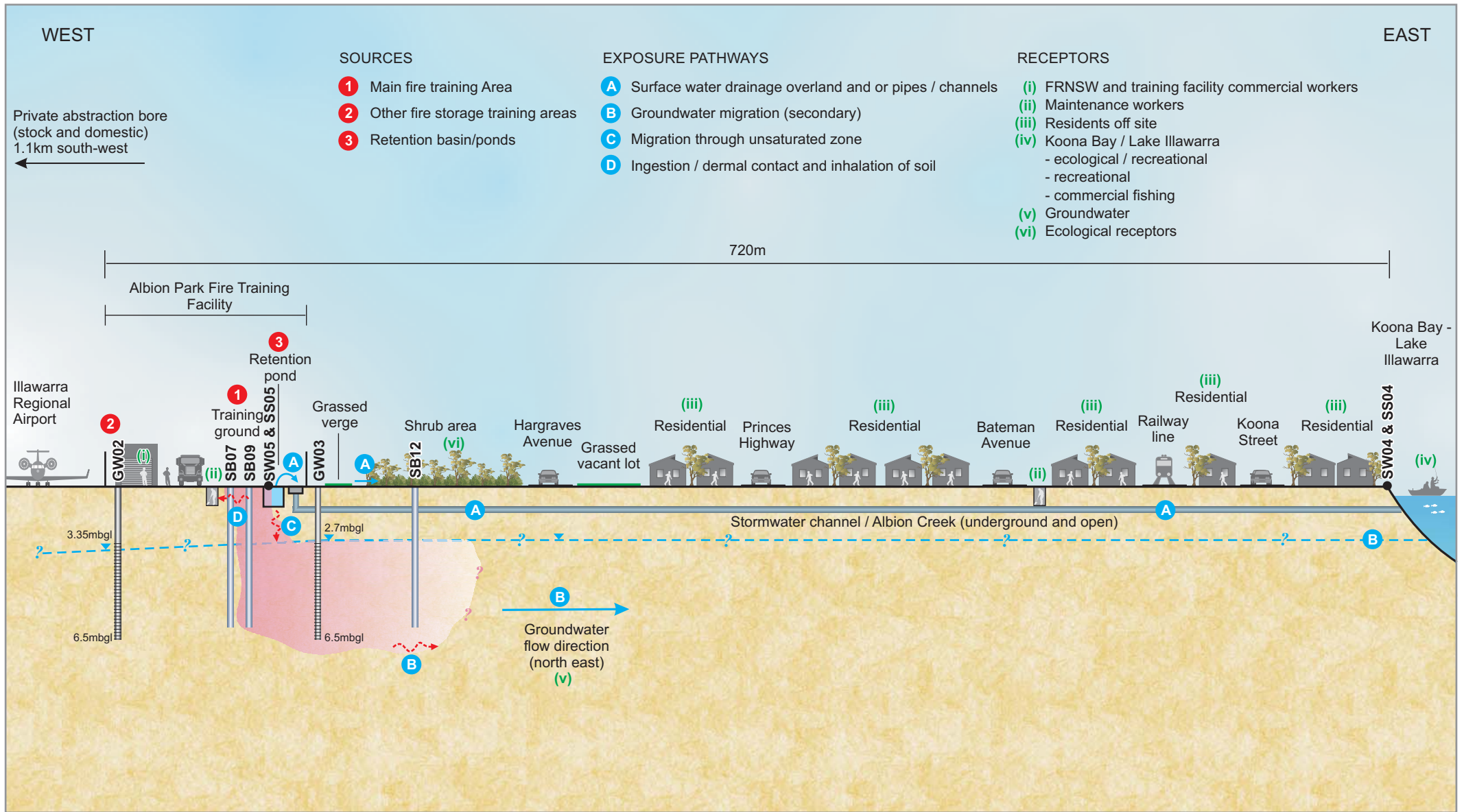
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Albion Park Site Investigation

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Groundwater Elevation Contours

Figure 8





Conceptual diagram only - not to scale

**LEGEND**

- Sandy CLAY
  - PFAS impact
  - Groundwater table
  - Sample location
  - Surface water flows
  - Migration
- Soil bore
  - Piezometer (groundwater well)
  - Screen



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**Conceptual Site Model**

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**Figure 9**

## **Appendix B** – Analytical results summary tables



Field ID	Location Code	Sample Depth Range	Sampled Date Time	Cations					TOC	Unassigned	Inorganics					Metals							TRH - NEPM 2013					TRH - NEPM 1999												
				Exchangeable Calcium	Exchangeable Magnesium	Exchangeable Potassium	Exchangeable Sodium	CEC			Total Organic Carbon	TCP Fluid	pH (final)	pH (Initial)	Moisture	Moisture Content (dried @ 103 °C)	pH (Lab)	pH (after HCL)	Arsenic	Caesium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total)		
meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%	mg/kg	pH Units	pH Units	%	%	pH Units	pH 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					
EQL				0.1	0.1	0.1	0.1	0.1	0.5	1	0.1	0.1	1	1	0.1	0.1	5	1	2	5	5	0.1	2	5																
DER (2017) Interim PFAS Guidelines - commercial/industrial																																								
DER (2017) Interim PFAS Guidelines - residential																																								
CRCCare Soil Direct Contact HSL-C Recreational / Open Space																																								
NEPM 2013 Table 1A(1) HIL C Rec																																								
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																																								
0-1m																																								
1-2m																																								
2-4m																																								
>4m																																								
B01_051216	SB06	0-0.15	5/12/2016	-	-	-	-	-	-	-	-	-	9	-	-	<5	<1	9	64	10	<0.1	5	28	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
B03_071216	SB12	0-0.1	7/12/2016	-	-	-	-	-	-	-	-	-	16	-	-	<2	<0.4	22	15	18	<0.1	5.2	14	<20	<20	<50	<50	<100	<100	-	<20	<20	<50	<50	<100	<100	<50	<50		
GW01_0.0_0.2	GW01	0-0.2	6/12/2016	-	-	-	-	-	-	-	-	-	9.3	-	-	<5	<1	15	16	16	<0.1	3	20	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW01_0.5_0.6	GW01	0.5-0.6	6/12/2016	-	-	-	-	-	-	-	-	-	25.3	-	-	<5	<1	39	18	16	<0.1	6	9	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW01_4.0_4.1	GW01	4-4.1	6/12/2016	-	-	-	-	-	-	-	-	-	21.1	-	-	<5	<1	21	18	16	<0.1	6	9	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW02_0.5_0.6	GW02	0.5-0.6	6/12/2016	0.4	9.1	0.3	10.6	20.4	0.8	-	-	-	22.8	4.5	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW02_0.5-0.6	GW02	0.5-0.6	6/12/2016	-	-	-	-	-	1	4.9	5.1	-	1.8	-	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW02_5.0_5.1	GW02	5-5.1	6/12/2016	-	-	-	-	-	-	-	-	-	23.1	-	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW02_6.0_6.1	GW02	6-6.1	6/12/2016	-	-	-	-	-	-	-	-	-	18	-	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW03_0.0_0.1	GW03	0-0.1	7/12/2016	-	-	-	-	-	-	-	-	-	9.9	-	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW03_0.0-0.1	GW03	0-0.1	7/12/2016	-	-	-	-	-	1	4.9	6.3	-	1.8	-	-	<5	<1	16	16	18	<0.1	4	26	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW03_5.0_5.1	GW03	5-5.1	7/12/2016	0.8	3.6	<0.1	2.5	6.9	<0.5	-	-	-	17.6	4.7	-	<5	<1	16	16	9	<0.1	4	18	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW04_0.5_0.6	GW04	0.5-0.6	8/12/2016	1.3	7	0.2	6.8	15.2	0.7	-	-	-	16.2	4.7	-	<5	<1	22	12	11	<0.1	4	8	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW04_6.0_6.1	GW04	6-6.1	8/12/2016	-	-	-	-	-	-	-	-	-	22.6	-	-	<5	<1	14	42	18	<0.1	5	30	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW05_1.6_1.7	GW05	1.6-1.7	8/12/2016	-	-	-	-	-	-	-	-	-	22	-	-	<5	<1	19	54	79	<0.1	11	278	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
GW05_3.4_3.5	GW05	3.4-3.5	8/12/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	-	-	19.1	5	-	<5	<1	20	29	11	<0.1	4	27	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB06_0.5_0.6	SB06	0.5-0.6	6/12/2016	-	-	-	-	-	-	-	-	-	18.9	-	-	<5	<1	22	26	15	<0.1	6	17	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB06_2.0_2.1	SB06	2-2.1	6/12/2016	0.2	5.3	0.1	1.2	15.1	0.8	-	-	-	20.7	5.1	-	<5	<1	26	33	15	<0.1	3	19	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB06_5.0_5.1	SB06	5-5.1	6/12/2016	-	-	-	-	-	-	-	-	-	18.1	-	-	<5	<1	22	26	15	<0.1	6	17	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB07_0.5_0.6	SB07	0.5-0.6	5/12/2016	-	-	-	-	-	-	-	-	-	8.4	-	-	<5	<1	<2	143	<5	<0.1	5	37	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB07_3.0_3.1	SB07	3-3.1	5/12/2016	<0.1	10.7	0.2	5	16.5	<0.5	-	-	-	20	5.6	-	<5	<1	12	14	13	0.3	3	12	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB07_ASHPALT_0.0_0.3	SB07	0-0.3	5/12/2016	-	-	-	-	-	-	-	-	-	1.1	-	-	<5	<1	17	30	12	<0.1	7	17	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB08_0.0_0.15	SB08	0-0.15	5/12/2016	-	-	-	-	-	-	-	-	-	9.7	-	-	<5	<1	17	30	12	<0.1	7	17	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<10	<50	<100	<100	<50
SB08_0.5_0.6	SB08	0.5-0.6	5/12/2016	-	-	-	-	-	-	-	-	-	15	-	-	<5	<1	17	30	12	<0.1	7	17	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<5					

				BTEX & MAH										PAH										SVOCs												
				Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Polycyclic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(e)pyrene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	PAHs (Sum of total) - Lab Calc	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (half LOR)					
EQL				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
DER (2017) Interim PFAS Guidelines - commercial/industrial				0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
DER (2017) Interim PFAS Guidelines - residential																																				
CRCCare Soil Direct Contact HSL-C Recreational / Open Space				120	18000	5300			15000																	1900										
NEPM 2013 Table 1A(1) HIL C Rec																																				
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand									230																											
0-1m				3	NL	NL																				NL										
1-2m				3	NL	NL																				NL										
2-4m				3	NL	NL																				NL										
>4m				3	NL	NL																				NL										
Field ID	Location Code	Sample Depth Range	Sampled Date Time																																	
BD1_051216	SB08	0-0.15	5/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6		
BD3_071216	SB12	0-0.1	7/12/2016	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	
GW01_0.0_0.2	GW01	0-0.2	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	
GW01_0.5_0.6	GW01	0.5-0.6	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW01_4.0_4.1	GW01	4-4.1	6/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
GW02_0.5_0.6	GW02	0.5-0.6	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	
GW02_0.5-0.6	GW02	0.5-0.6	6/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
GW02_5.0_5.1	GW02	5-5.1	6/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
GW02_6.0_6.1	GW02	6-6.1	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	
GW03_0.0_0.1	GW03	0-0.1	7/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW03_0.0-0.1	GW03	0-0.1	7/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
GW03_5.0_5.1	GW03	5-5.1	7/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW04_0.5_0.6	GW04	0.5-0.6	8/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW04_6.0_6.1	GW04	6-6.1	8/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW05_1.6_1.7	GW05	1.6-1.7	8/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
GW05_3.4_3.5	GW05	3.4-3.5	8/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB06_0.5_0.6	SB06	0.5-0.6	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB06_2.0_2.1	SB06	2-2.1	6/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB06_5.0_5.1	SB06	5-5.1	6/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SB07_0.5_0.6	SB07	0.5-0.6	5/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB07_3.0_3.1	SB07	3-3.1	5/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB07 ASPHALT_0.0_0.3	SB07	0-0.3	5/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SB08_0.0_0.15	SB08	0-0.15	5/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB08_0.5_0.6	SB08	0.5-0.6	5/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SB08_2.0_2.1	SB08	2-2.1	5/12/2016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6
SB08_5.0_5.1	SB08	5-5.1	5/12/2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SB09_0.0_0.1	SB09	0-0.1	5/12/2016	-	-																															











**Appendix B  
Table A3  
Sediment Analytical Results 2017**

	SVOCs						PFAS													
	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (half LOR)	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluorobutanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorooctane sulfonic acid (PFOS)	PFAS (Sum of Total)(WA DER List)
	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
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.001	0.0002	0.0002	0.0002	0.0002
DER (2017) Interim PFAS Guidelines - commercial/industrial							100								1000					
DER (2017) Interim PFAS Guidelines - residential							4								40					
NEPM 2013 Table 1A(1) HIL C Rec																				
NEPM 2013 Table 1A(1) HIL D Comm/Ind																				
NEPM 2013 Table 1A(3) HSL C Rec Soil for Vapour Intrusion, Sand																				
0-1m		NL <sup>#6</sup>																		
1-2m		NL <sup>#6</sup>																		
2-4m		NL <sup>#6</sup>																		
>4m		NL <sup>#6</sup>																		
NEPM 2013 Table 1A(3) HSL D Comm/Ind Soil for Vapour Intrusion, Sand																				
0-1m		NL <sup>#6</sup>																		
1-2m		NL <sup>#6</sup>																		
2-4m		NL <sup>#6</sup>																		
>4m		NL <sup>#6</sup>																		

Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0049	<0.0005	<0.0005	<0.0002	0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0001	<0.0002	<0.0002	0.0047	0.0049
SS01	SS01		16/12/2016	<0.5	<0.5	0.9	0.8	1.2	1.4	1	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0001	<0.0002	<0.0002	0.0047	0.0049
SS02	SS02		16/12/2016	<0.5	<0.5	0.9	0.8	1.2	1.4	1	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0001	<0.0002	<0.0002	0.0047	0.0049
SS03	SS03		16/12/2016	<1	<1	<1	<0.5	1.2	0.6	0.115	<0.0005	<0.0005	<0.0002	0.0027	0.0004	<0.0005	0.0008	0.0006	<0.0001	<0.0002	<0.0002	0.112	0.116
SS04	SS04		16/12/2016	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0015	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0001	<0.0002	<0.0002	0.0015	0.0015
SS05	SS05		16/12/2016	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0757	<0.0005	<0.0005	0.0005	0.0039	0.0014	<0.0005	0.0007	0.0024	<0.0001	0.0007	0.0031	0.0718	0.0845
SSQA2	SS05		16/12/2016	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.197	<0.0005	0.0006	0.0008	0.0108	0.0019	<0.0005	0.0019	0.0051	<0.0001	0.0012	0.0045	0.186	0.212

**Statistical Summary**

Number of Results	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Number of Detects	0	0	1	1	6	6	5	0	1	2	4	3	0	3	3	0	2	2	5	5			
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.0001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Minimum Detect	ND	ND	0.9	0.8	1.2	0.6	0.0015	ND	0.0006	0.0005	0.0002	0.0004	ND	0.0007	0.0006	ND	0.0007	0.0031	0.0015	0.0015			
Maximum Concentration	<1	<1	<1	0.8	1.4	1	0.197	<0.0005	0.0006	0.0008	0.0108	0.0019	<0.0005	0.0019	0.0051	<0.0001	0.0012	0.0045	0.186	0.212			
Maximum Detect	ND	ND	0.9	0.8	1.4	1	0.197	ND	0.0006	0.0008	0.0108	0.0019	ND	0.0019	0.0051	ND	0.0012	0.0045	0.186	0.212			
Average Concentration	0.29	0.29	0.4	0.34	1.2	0.67	0.066	0.00025	0.00031	0.00028	0.003	0.00067	0.00025	0.00069	0.0014	0.0005	0.00038	0.0013	0.063	0.07			
Median Concentration	0.25	0.25	0.25	0.25	1.2	0.6	0.0403	0.00025	0.00025	0.0001	0.00145	0.00025	0.00025	0.000475	0.00035	0.0005	0.0001	0.0001	0.03825	0.0447			
Standard Deviation	0.1	0.1	0.26	0.22	0.082	0.16	0.08	0	0.00014	0.0003	0.0042	0.00079	0	0.00064	0.002	0	0.00047	0.002	0.076	0.085			
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Env Stds Comments**

- #1: Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important
- #2: In the absence of a guideline value for total chromium, chromium VI value adopted
- #3: Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 5
- #4: Elemental mercury: HIL does not address elemental mercury. a site specific assessment should
- #5: Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should cor
- #6: Derived soil HSL exceeds soil saturation concentration
- #7: To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.

**Data Comments**

- #1 Quantification of linear and branched isomers has been conducted as a single total response



Appendix B  
Table B  
ASLP Analytical Results 2017

	PFAS																																
	Perfluorodecanesulfonic acid (PFDS)	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamidoacetic acid	N-Methyl perfluorooctane sulfonamidoacetic acid	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid	Perfluorodecanesulfonic acid	8:2 Fluorotelomer sulfonic acid	N-Ethyl perfluorooctane sulfonamide	N-Ethyl perfluorooctane sulfonamidoethanol	N-Methyl perfluorooctane sulfonamide	N-Methyl perfluorooctane sulfonamidoethanol	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluoropentane sulfonic acid	Perfluorobutanoic acid	Perfluorodecanoic acid	Perfluorododecanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorononanoic acid	Perfluorooctane sulfonic acid (PFO5)	Perfluorooctane sulfonamide (FOSA)	Perfluorotetradecanoic acid	Perfluorotridecanoic acid	Perfluoroundecanoic acid	PFAS (Sum of Total)	PFAS (Sum of Total)(WA DER List)		
EQL	0.02	0.01	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.02	0.02	0.02	0.01	0.01	
WA DER (2017) Drinking water quality		5 <sup>#6</sup>														50 <sup>#6</sup>																	
WA DER (2017) Ecological freshwater		0.0023 <sup>#5</sup>														190																	
WA DER (2017) Recreational water		50 <sup>#7</sup>														500 <sup>#7</sup>																	

Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time	Matrix_Description	<0.02	1.37	<0.05	<0.05	<0.02	<0.02	0.05	0.06	0.49	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.05	<0.1	<0.02	<0.02	0.02	0.16	<0.02	0.88	<0.02	<0.05	<0.02	<0.02	1.82	1.71
GW01_0.0-0.2	GW01	0-0.2	6/12/2016		<0.02	1.37	<0.05	<0.05	<0.02	<0.02	0.05	0.06	0.49	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.05	<0.1	<0.02	<0.02	0.02	0.16	<0.02	0.88	<0.02	<0.05	<0.02	<0.02	1.82	1.71
GW02_0.5-0.6	GW02	0.5-0.6	6/12/2016		<0.02	2.55	<0.05	<0.05	<0.02	<0.02	0.14	0.04	1.17	0.04	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.09	<0.1	<0.02	<0.02	<0.02	0.14	<0.02	1.38	<0.02	<0.05	<0.02	<0.02	3.04	2.91
GW03_0.0-0.1	GW03	0-0.1	7/12/2016		<0.02	76.9	<0.05	<0.05	<0.02	<0.02	0.75	1.47	9.52	0.36	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.39	0.86	<0.1	<0.02	<0.02	0.42	1.92	<0.02	67.4	<0.02	<0.05	<0.02	<0.02	84.1	81.8
GW04_0.5-0.6	GW04	0.5-0.6	8/12/2016		<0.02	0.49	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.43	<0.02	<0.05	<0.02	<0.02	0.49	0.49
GW05_1.6-1.7	GW05	1.6-1.7	8/12/2016		<0.02	0.21	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	0.03	<0.02	0.15	<0.02	<0.05	<0.02	<0.02	0.24	0.24
SB06_0.5-0.6	SB06	0.5-0.6	6/12/2016		0.03	192	<0.05	<0.05	<0.02	<0.02	0.48	2.49	8.53	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	1.81	0.42	<0.1	0.02	<0.02	0.24	1.13	<0.02	183	0.02	<0.05	<0.02	<0.02	198	196
SB06_5.0-5.1	SB06	5-5.1	6/12/2016		<0.02	10.8	<0.05	<0.05	<0.02	<0.02	1.03	0.2	9.67	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23	0.7	<0.1	<0.02	<0.02	0.12	1.31	<0.02	1.15	<0.02	<0.05	<0.02	<0.02	14.6	13.7	
SB07_3.0-3.1	SB07	3-3.1	5/12/2016		<0.02	0.75	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	0.71	<0.02	<0.05	<0.02	<0.02	0.77	0.77	
SB08_0.5-0.6	SB08	0.5-0.6	5/12/2016		<0.02	21.5	<0.05	<0.05	<0.02	<0.02	0.15	0.55	1.96	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23	0.14	<0.1	<0.02	<0.02	0.04	0.18	<0.02	19.5	<0.02	<0.05	<0.02	<0.02	22.8	22.1	
SB09_0.0-0.1	SB09	0-0.1	5/12/2016		0.29	550	<0.05	<0.05	<0.02	<0.02	1.93	6.58	26	0.69	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.35	3.13	1.89	<0.1	0.07	<0.02	0.37	2.77	<0.02	524	1.27	<0.05	<0.02	<0.02	570	560
SB09_4.0-4.1	SB09	4-4.1	6/12/2016		<0.02	10.7	<0.05	<0.05	<0.02	<0.02	0.97	0.41	4.78	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.38	0.73	<0.1	<0.02	<0.02	0.23	1.59	<0.02	5.88	<0.02	<0.05	<0.02	<0.02	15.2	14.1	
SB10_0.0-0.1	SB10	0-0.1	6/12/2016		<0.02	11.5	<0.05	<0.05	<0.02	<0.02	0.09	0.32	2.63	0.35	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.37	0.12	<0.1	<0.02	<0.02	0.19	0.65	<0.02	8.84	0.05	<0.05	<0.02	<0.02	13.6	13.1	
SB12_0.0-0.1	SB12	0-0.1	7/12/2016		<0.02	0.44	<0.05	<0.05	<0.02	<0.02	0.32	<0.02	0.37	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.1	<0.1	<0.02	<0.02	<0.02	0.15	<0.02	0.07	<0.02	<0.05	<0.02	<0.02	1.07	0.97	
SB13_0.5-0.6	SB13	0.5-0.6	7/12/2016		<0.02	0.17	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	0.17	<0.02	<0.05	<0.02	<0.02	0.17	0.17	
SB14_0.5-0.6	SB14	0.5-0.6	8/12/2016		<0.02	0.59	<0.05	<0.05	<0.02	<0.02	0.02	<0.02	0.45	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.04	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	0.14	<0.02	<0.05	<0.02	<0.02	0.67	0.63	
SB15_1.0-1.1	SB15	1-1.1	8/12/2016		<0.02	2.71	<0.05	<0.05	<0.02	<0.02	0.03	0.08	1.18	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.06	<0.1	<0.02	<0.02	0.03	0.22	0.05	1.53	<0.02	<0.05	<0.02	<0.02	3.29	3.1	

Env Stds Comments

#1: Criteria adopted from DER (2017) which are based on the enHealth (2016) recommendations. Dilution factor of 10 applied





**Appendix B  
Table A4  
Sediment Analytical Results - Ecological 2017**

	TOC			Inorganics							TRH - NEPM 2013							TRH - NEPM 1999							BTEX & MAH							PAH						
	Total Organic Carbon	Moisture	pH (Lab)	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Polycyclic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene						
	%	%	pH Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg						
EQL	0.5	1	0.1	10	10	50	50	100	100	50	10	50	100	100	50	0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5						
<b>DER 2017 Ecological PFOS/PFOA (Commercial/Industrial)</b>																																						
<b>DER 2017 Ecological PFOS/PFOA (Urban residential)</b>																																						
NEPM 2013 EIL-Commercial/Industrial																																						
NEPM 2013 EIL-Urban Residential- Public Open Space																																						
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil 0-2m																																						
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																																						

Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time	TOC	Moisture	pH	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	C6 - C9 Fraction	C10 - C14 Fraction	C15 - C28 Fraction	C29 - C36 Fraction	C10 - C36 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Polycyclic aromatic hydrocarbons	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	
SS01	SS01		16/12/2016	0.6	28.2	6.6	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SS02	SS02		16/12/2016	4	35	6.8	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	8.4	2	<0.5	<0.5	<0.5	0.6	0.6	0.8	<0.5	0.7	
SS03	SS03		16/12/2016	12.1	76.1	6.6	<10	<10	<60	<60	<100	<100	<60	<10	<60	<110	<110	<60	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	
SS04	SS04		16/12/2016	1.8	25.1	8.6	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
SS05	SS05		16/12/2016	0.7	32.9	5.4	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
SSQA2	SS05		16/12/2016	0.6	37.7	5.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	

Statistical Summary																																			
Number of Results	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Number of Detects	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	0	1
Minimum Concentration	0.6	25.1	5.2	<10	<10	<50	<50	<100	<100	<50	<10	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Minimum Detect	0.6	25.1	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.4	2	ND	ND	ND	0.6	0.6	0.8	ND	0.7
Maximum Concentration	12.1	76.1	8.6	<10	<10	<60	<60	<100	<100	<60	<10	<60	<110	<110	<60	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	8.4	2	<1	<1	<1	<1	<1	<1	<1	<1	
Maximum Detect	12.1	76.1	8.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.4	2	ND	ND	ND	0.6	0.6	0.8	ND	0.7
Average Concentration	3.3	39	6.5	5	5	26	26	50	50	26	5	26	51	51	26	0.1	0.25	0.25	0.25	0.25	0.25	0.25	0.1	1.6	0.58	0.29	0.29	0.29	0.35	0.35	0.38	0.29	0.37		
Median Concentration	1.25	33.95	6.6	5	5	25	25	50	50	25	5	25	50	50	25	0.1	0.25	0.25	0.25	0.25	0.25	0.1	1.6	0.58	0.29	0.29	0.29	0.35	0.35	0.38	0.29	0.37			
Standard Deviation	4.5	19	1.2	0	0	2	2	0	0	2	0	2	2	2	0	0	0	0	0	0	0	0	0	3.3	0.7	0.1	0.1	0.1	0.16	0.16	0.23	0.1	0.19		
Number of Guideline Exceedances	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	
Number of Guideline Exceedances(Detects Only)	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0		

**Env Stds Comments**

- #1:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
- #2:To obtain F2 subtract naphthalene from the >C10 - C16 fraction.
- #3:enHealth Interim Human Health PFC Guidelines (Drinking Water)
- #4: enHealth Interim Human Health PFC Guidelines (Recreational Water)
- #5:WA DER 2017 - Ecological PFC 99% species protection Guidelines

**Data Comments**

- #1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.



**Appendix B  
Table A4  
Sediment Analytical Results - Ecological 2017**

	SVOCs										PFAS													
	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (half LOR)	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluorobutanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic sulfonic acid (PFOS)	PFAS (Sum of Total)(WA DER List)
	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
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0002	0.0005	0.0005	0.0002	0.0002	0.0002	0.0005	0.0005	0.0002	0.001	0.0002	0.0002	0.0002	0.0002
DER 2017 Ecological PFOS/PFOA (Commercial/Industrial)																			2					4
DER 2017 Ecological PFOS/PFOA (Urban residential)																			7					15
NEPM 2013 EIL-Commercial/Industrial						370																		
NEPM 2013 EIL-Urban Residential- Public Open Space						170																		
NEPM 2013 Table 1B(6) ESLs for Comm/Ind, Coarse Soil 0-2m																								
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil 0-2m																								

Field_ID	Location_Code	Sample_Depth_Range	Sampled_Date_Time	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero)	Benzo(a)pyrene TEQ (LOR)	Benzo(a)pyrene TEQ (half LOR)	PFHxS and PFOS (Sum of Total) - Lab Calc	4:2 Fluorotelomer sulfonic acid	10:2 Fluorotelomer sulfonic acid	Perfluorobutane sulfonic acid	Perfluorohexane sulfonic acid (PFHxS)	Perfluoropentanoic acid	8:2 Fluorotelomer sulfonic acid	6:2 Fluorotelomer Sulfonate (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Perfluorobutanoic acid	Perfluoroheptanoic acid	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic sulfonic acid (PFOS)	PFAS (Sum of Total)(WA DER List)	
SS01	SS01		16/12/2016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0049	<0.0005	<0.0005	<0.0002	0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	0.0047	0.0049	
SS02	SS02		16/12/2016	0.7	<0.5	2.1	<0.5	<0.5	<0.5	0.9	0.8	1.4	1	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	
SS03	SS03		16/12/2016	<1	<1	<1	<1	<1	<1	<1	<0.5	1.2	0.6	0.115	<0.0005	<0.0005	<0.0002	0.0027	0.0004	<0.0005	0.0008	0.0006	<0.001	<0.0002	<0.0002	0.112	0.116	
SS04	SS04		16/12/2016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0015	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	0.0015	0.0015
SS05	SS05		16/12/2016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.0757	<0.0005	<0.0005	0.0005	0.0039	0.0014	<0.0005	0.0007	0.0024	<0.001	0.0007	0.0031	0.0718	0.0845	
SSQA2	SS05		16/12/2016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	0.197	<0.0005	0.0006	0.0008	0.0108	0.0019	<0.0005	0.0019	0.0051	<0.001	0.0012	0.0045	0.186	0.212	

Statistical Summary																												
Number of Results	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Number of Detects	1	0	1	0	0	0	1	1	6	6	5	0	1	2	4	3	0	3	3	0	2	2	5	5				
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	0.6	<0.0002	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Minimum Detect	0.7	ND	2.1	ND	ND	ND	0.9	0.8	1.2	0.6	0.0015	ND	0.0006	0.0005	0.0002	0.0004	ND	0.0007	0.0006	ND	0.0007	0.0031	0.0015	0.0015				
Maximum Concentration	<1	<1	2.1	<1	<1	<1	<1	0.8	1.4	1	0.197	<0.0005	0.0006	0.0008	0.0108	0.0019	<0.0005	0.0019	0.0051	<0.001	0.0012	0.0045	0.186	0.212				
Maximum Detect	0.7	ND	2.1	ND	ND	ND	0.9	0.8	1.4	1	0.197	ND	0.0006	0.0008	0.0108	0.0019	ND	0.0019	0.0051	ND	0.0012	0.0045	0.186	0.212				
Average Concentration	0.37	0.29	0.6	0.29	0.29	0.29	0.4	0.34	1.2	0.67	0.066	0.00025	0.00031	0.00028	0.003	0.00067	0.00025	0.00069	0.0014	0.0005	0.00038	0.0013	0.063	0.07				
Median Concentration	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.2	0.6	0.0403	0.00025	0.00025	0.0001	0.00145	0.00025	0.00025	0.000475	0.00035	0.0005	0.0001	0.0001	0.03825	0.0447				
Standard Deviation	0.19	0.1	0.74	0.1	0.1	0.1	0.26	0.22	0.082	0.16	0.08	0	0.00014	0.0003	0.0042	0.00079	0	0.00064	0.002	0	0.00047	0.002	0.076	0.085				
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Env Stds Comments**  
 #1:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.  
 #2:To obtain F2 subtract naphthalene from the >C10 - C16 fraction.  
 #3:enHealth Interim Human Health PFC Guidelines (Drinking Water)  
 #4: enHealth Interim Human Health PFC Guidelines (Recreational Water)  
 #5:WA DER 2017 - Ecological PFC 99% species protection Guidelines

**Data Comments**  
 #1 Quantification of linear and branched isomers has been conducted as a single total response







**Appendix B**  
**Table C**  
**Groundwater and Surface Water Analytical Results - 2017**

SampleCode	Field_ID	Location_Code	Sampled_Date_Time	Alkalinity				Major Ions							
				Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Bicarbonate Alkalinity as CaCO3	Calcium (Filtered)	Chloride	Magnesium (Filtered)	Anions Total	Potassium (Filtered)	Sodium (Filtered)	Cations Total	Ionic Balance
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	mg/L	mg/L	meq/L	%
EQL				1	1	1	1	1	1	1	0.01	1	1	0.01	0.01
CRCCare GW HSL for vap.int Intrusive Maint. - Sand, 2-4m															
NEPM 2013 Table 1A(4) HSL D Comm/Ind GW for Vapour Intrusion, Sand 2-4m															
NEPM 2013 Table 1C GILs, Drinking Water (inclusive of WA DER PFAS criterion)															
NEPM 2013 Table 1C GILs, Marine Waters (inclusive of WA DER PFAS criterion)															
NHMRC Recreational Guidelines 2008 (inclusive of WA DER PFAS criterion)															
ES1629123013	GW01	GW01	16/12/2016	<1	<1	124	124	108	4260	228	132	11	2470	132	0.11
ES1629123018	GWQA3	GW01	16/12/2016	<1	<1	121	121	112	4340	229	135	11	2440	131	1.49
ES1701791007	GW01	GW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791007R1	GW01	GW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791007R2	GW01	GW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791012	GWQA3	GW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123014	GW02	GW02	16/12/2016	<1	<1	<1	<1	62	6750	424	204	5	3540	192	3.04
ES1701791008	GW02	GW02	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123015	GW03	GW03	16/12/2016	<1	<1	12	12	54	5160	252	163	4	2830	147	5.19
ES1701791009	GW03	GW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791009R1	GW03	GW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791009R2	GW03	GW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123016	GW04	GW04	16/12/2016	<1	<1	<1	<1	63	7440	528	234	6	3960	219	3.23
ES1701791010	GW04	GW04	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123017	GW05	GW05	16/12/2016	<1	<1	<1	<1	72	4640	267	156	7	2500	134	7.5
ES1701791011	GW05	GW05	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123007	SW01	SW01	16/12/2016	<1	<1	27	27	7	6	2	0.92	2	8	0.91	-
ES1701791001	SW01	SW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791001R1	SW01	SW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791001R2	SW01	SW01	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123008	SW02	SW02	16/12/2016	<1	<1	49	49	25	19	5	2.43	2	11	2.19	-
ES1701791002	SW02	SW02	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123009	SW03	SW03	16/12/2016	<1	<1	28	28	8	13	2	1.18	2	11	1.09	-
ES1701791003	SW03	SW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791003R1	SW03	SW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791003R2	SW03	SW03	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123010	SW04	SW04	16/12/2016	<1	<1	38	38	44	1500	108	48.6	37	891	50.8	2.23
ES1701791004	SW04	SW04	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1629123011	SW05	SW05	16/12/2016	<1	<1	60	60	14	23	5	1.93	4	24	2.26	-
ES1629123012	SWQA1	SW05	16/12/2016	<1	<1	72	72	16	23	5	2.17	4	20	2.18	-
ES1701791005	SW05	SW05	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791005R1	SW05	SW05	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791005R2	SW05	SW05	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-
ES1701791006	SWQA1	SW05	16/12/2016	-	-	-	-	-	-	-	-	-	-	-	-

**Env Stds Comments**

- #1: To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
- #2: To obtain F2 subtract naphthalene from the >C10 - C16 fraction.
- #3: Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (2000) for site specific har
- #4: Values calculated using hardness of 30 mg/L CaCO3. Chemical for which possible bioaccumulation and sec
- #5: Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer
- #6: Values calculated using hardness of 30 mg/L CaCO3. Figure may not protect key species from chronic toxic
- #7: Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further i
- #8: WA DER 2017 - Ecological PFC 99% species protection guidelines
- #9: WA DER 2017 - Drinking water guideline, based on enHealth (2016) recommendations
- #10: WA DER 2017 - Recreational waters guideline, based on enHealth (2016) recommendations

## **Appendix C** –Survey results

CODE	EASTING	NORTHING	RL (GPS AHD)	DESCRIPTION
GW02	297323.869	6173480.065	6.270	TOP OF GATIC
GW02-1	297323.906	6173479.980	6.293	TOP OF CASE
GW01	297398.977	6173432.086	6.168	TOP OF GATIC
GW01-1	297398.909	6173432.014	6.170	TOP OF CASE
GW03	297393.100	6173559.973	5.400	TOP OF GATIC
GW03-1	297393.098	6173559.972	5.398	TOP OF CASE
GW04	297307.595	6173658.896	5.041	TOP OF GATIC
GW04-1	297307.563	6173658.845	5.036	TOP OF CASE
GW05	297258.358	6173898.054	4.803	TOP OF GATIC
GW05-1	297258.293	6173898.098	4.814	TOP OF CASE

## **Appendix D** – Groundwater database search results



# All Groundwater Map

All data times are Eastern Standard Time

Map Info

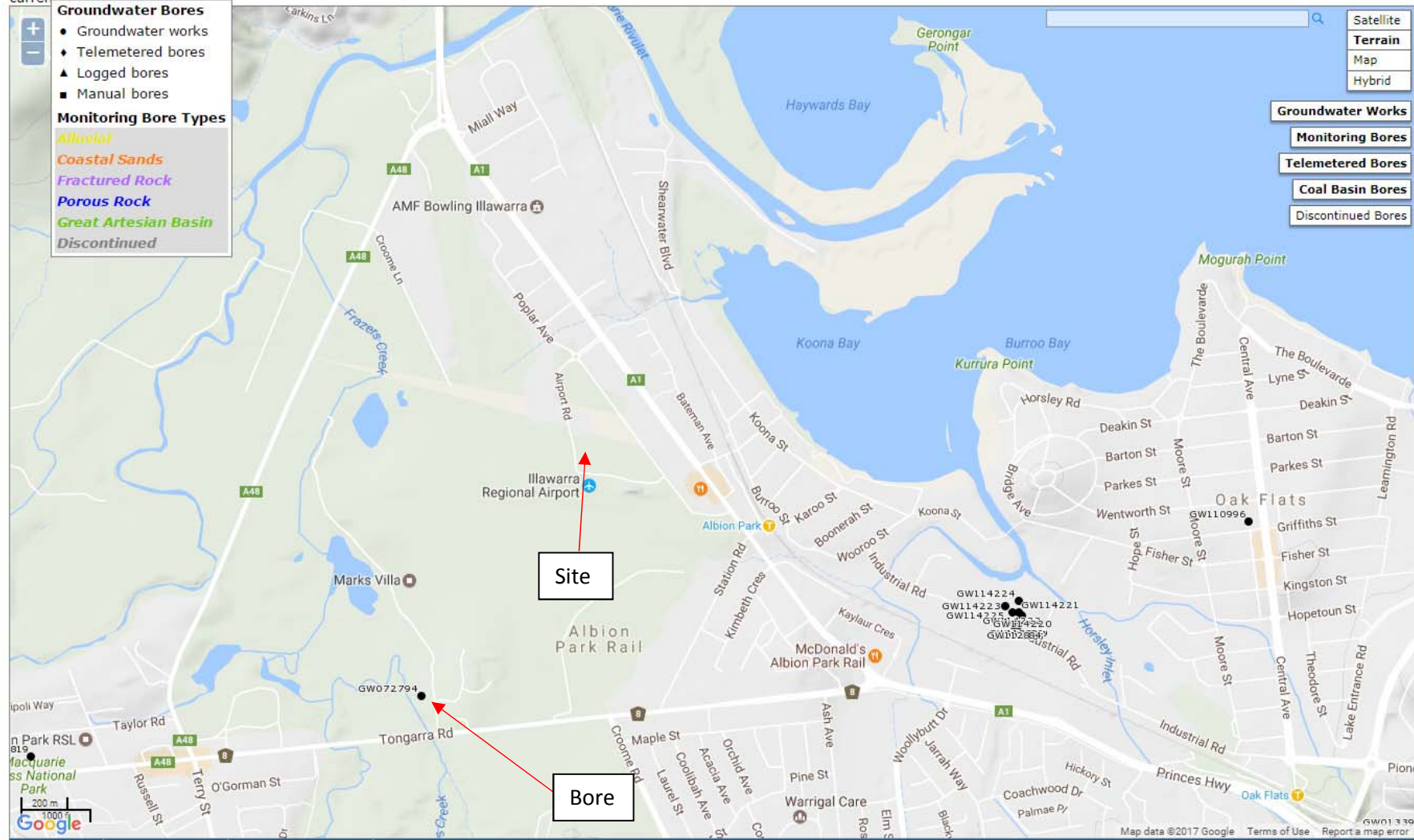
current site: [GW072794](#)

### Groundwater Bores

- Groundwater works
- ◆ Telemetered bores
- ▲ Logged bores
- Manual bores

### Monitoring Bore Types

- Alluvial
- Coastal Sands
- Fractured Rock
- Porous Rock
- Great Artesian Basin
- Discontinued



- Satellite
- Terrain
- Map
- Hybrid

### Groundwater Works

#### Monitoring Bores

#### Telemetered Bores

#### Coal Basin Bores

#### Discontinued Bores

# NSW Office of Water

## Work Summary

GW072794

Licence:

Licence Status:

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

Work Type: Bore open thru rock

Work Status:

Construct.Method: Rotary Air

Owner Type: Private

Commenced Date:

Completion Date: 06/02/1995

Final Depth: 30.00 m

Drilled Depth: 30.00 m

Contractor Name:

Driller: Phillip Arthur Windley

Assistant Driller:

Property:

Standing Water Level

GWMA:  
GW Zone:

(m):  
Salinity Description: Salty  
Yield (L/s):

### Site Details

Site Chosen By:

County Parish Cadastre  
Form A: CAMDE CAMDE.027 L6 DP70360  
Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: 214 - WOLLONGONG COAST  
Area/District:

Grid Zone:

Scale:

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

Northing: 6172563.0

Latitude: 34°34'07.0"S

Elevation Unknown

Easting: 296754.0

Longitude: 150°47'04.0"E

Source:

GS Map: -

MGA Zone: 0

Coordinate GD.,ACC.GIS  
Source:

### Construction

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

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1	1	Casing	P.V.C.	0.00	7.00	160			Driven into Hole

### Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
20.00	20.50	0.50	Fractured	6.00		0.30			

### Geologists Log

**Drillers Log**

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00		Unknown	
1.00	7.00	6.00	Clay	Clay	
7.00	30.00	23.00	Shale	Shale	

**Remarks**

---

\*\*\* End of GW072794 \*\*\*

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

## **Appendix E** – Field sampling sheets and calibration certificates





# Purging and Sampling Record

Surface Water

Bore ID: SW6

**Job Information**

Client:   
 Project: Albion Park   
 Proj. No.: 2125583   
 Sampler: JL/TG   
 Date: 16/12/2016   
 Round: .....

**Sampling Information**

Purge Method: grab   
 Sample Method: .....   
 WQ Meter Type: .....   
 Flow Cell: Y / N   
 Pump Depth: .....m   
 WLevel Meter Type: Dip / Fox / Int.Fce / Gge   
 Field Filtered? Y / N (filter vessel, disposable filter, filter/syringe)

**Bore Information**

SWL(mbTOC): 2.0 m Logic Check: .....   
 Screen: From: ..... to: ..... m   
 NAPL Check: .....   
 Ref.datum: .....   
 Bore Depth: 6.99 m   
 Stick Up:   
 Bore Diam.: ..... mm   
 Well Cap Secure?.....

Time (.....)	Volume (L)	Temp (°C)	SWL (m TOC)	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Comment:
Stable when (3 consecutive readings):			stable	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
SW02		21.5	—	5.08	200.0	7.26	59.7	Slightly yellow
		21.5	—	5.06	199.9	7.26	59.6	
SW02		19.7	—	5.11	199.8	7.25	59.6	↓ yellow
		19.7	—	4.60	84.4	8.12	52.7	
SW03		19.7	—	4.49	84.6	8.09	52.8	↓ Slightly yellow
		18.8	—	4.43	84.6	8.07	52.9	
		18.8	—	4.64	96.8	7.41	62.5	
SW04		18.8	—	4.34	96.8	7.33	63.1	↓ grey/brown/yellow
		19.6	—	4.15	96.9	7.28	63.2	
		19.6	—	5.51	452.7	8.40	77.2	
SW05		19.6	—	5.32	451.8	8.36	77.6	↓ brown/orange
	100 7L	18.5	—	5.17	451.5	8.31	77.9	
	100 7L	18.5	—	4.26	162.9	7.37	72.5	
	100 7L	18.5	—	4.01	163.0	7.35	72.1	
			—	3.74	162.9	7.32	71.6	

**Field QA Checks:**

Air bubbles in vials? Y / N Any violent reactions? Y / N   
 Decontamination as per GHD procedure? Y / N   
 Was sampling equipment pre-cleaned? Y / N   
 COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.	PFAS	TOS / pH
Preservatives	✓	✓								✓	✓

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

0417625595

**Purge Volumes**

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

\*Double













# Purging and Sampling Record

Bore ID: GWO2

Job Information	Sampling Information	Bore Information
Client: Albion Park Project: Albion Park Proj. No.: 2125583 Sampler: JL/TG Date: 16/12/2016 Round: .....	Purge Method: <u>peri</u> Sample Method: <u>low</u> WQ Meter Type: <u>ysi</u> Flow Cell: Y / N Pump Depth: <u>4.5</u> m WLevel Meter Type: Dip / Fox / Int.Fce / Gge Field Filtered? Y / N (filter vessel, disposable filter, filter/syringe)	SWL(mbTOC): <u>3.350</u> m Screen: From:.....to..... m NAPL Check:..... Ref.datum:..... Bore Depth: <u>6.660</u> m Logic Check: ..... Stick Up: <u>1</u> m Bore Diam.: <u>50</u> mm Well Cap Secure? <u>yes</u>

Time (.....)	Volume (L)	Temp (°C)	SWL (m TOC)	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	stable	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	
1211	1	19.3	3.76	3.01	15363	4.33	219.2	Purged dry. 0720 16/12/16. Cloudy orange ↓
1214	2	19.3	3.925	3.00	15327	4.37	217.7	
1216	3	19.2	4.142	3.02	15320	4.37	217.9	

**Field QA Checks:**  
 Air bubbles in vials? Y / N Any violent reactions? Y / N  
 Decontamination as per GHD procedure? Y / N  
 Was sampling equipment pre-cleaned? Y / N  
 COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.	PFAS	grech		
Preservatives	✓	✓								✓	✓		

**Comment:** Duplicate samples collected, bottles used, access, condition of headworks etc

5 bottles

Purge Volumes			
Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

\*Double for gravel pack





# Purging and Sampling Record

Bore ID: CW03

Job Information	Sampling Information	Bore Information
Client: Project: Albion Park Proj. No.: 2125583 Sampler: JL/TG Date: 16/12/2016 Round: .....	Purge Method: <u>Peri</u> Sample Method: <u>low flow</u> WQ Meter Type: <u>YSI</u> Flow Cell: Y / N Pump Depth: <u>5</u> m WLevel Meter Type: Dip / Fox / Int.Fce / Gge Field Filtered? Y / N (filter vessel, disposable filter, filter/syringe)	SWL(mbTOC): <u>2.721</u> m Screen: From:.....to..... m NAPL Check:..... Ref.datum: ..... Bore Depth: <u>6.395</u> m Logic Check: ..... Stick Up: ..... m Bore Diam.: <u>50</u> mm Well Cap Secure? <u>Y</u>

Time (.....)	Volume (L)	Temp (°C)	SWL (m TOC)	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
Stable when (3 consecutive readings):		-	stable	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	
106	1	18.3	3.000	1.92	11699	4.77	132.6	purged dry 0850 16/12/16 brown / yellow / orange ↓
108	2	18.3	3.070	1.80	11703	4.72	129.0	
110	3	18.3	3.140	1.81	11706	4.72	128.0	

**Field QA Checks:**  
 Air bubbles in vials? Y / N Any violent reactions? Y / N  
 Decontamination as per GHD procedure? Y / N  
 Was sampling equipment pre-cleaned? Y / N  
 COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.				
Preservatives													

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

Purge Volumes

Casing Int. Dia (mm)	50	100	150
Vol (L/m of casing)	2.0	7.9	17.7

\*Double for gravel pack





# Purging and Sampling Record

Bore ID: CW04

Job Information	Sampling Information	Bore Information
Client: Albion Park Project: Albion Park Proj. No.: 2125583 Sampler: JL/TG Date: 16/12/2016 Round: .....	Purge Method: ..... Sample Method: ..... WQ Meter Type: ..... Flow Cell: Y / N      Pump Depth: .....m WLevel Meter Type: Dip / Fox / Int.Fce / Gge Field Filtered? Y / N (filter vessel, disposable filter, filter/syringe)	SWL(mbTOC): <u>2.610</u> ..... m      Logic Check: ..... Screen: From:.....to..... m      Stick Up: ..... m NAPL Check:..... Ref.datum: ..... Bore Depth: <u>6.045</u> ..... m      Bore Diam.: ..... mm Well Cap Secure?.....

Time (.....)	Volume (L)	Temp (°C)	SWL (m TOC)	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Comment: Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
<i>Stable when (3 consecutive readings):</i>		-	<i>stable</i>	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	
1157	1	18.6	3.001	3.29	16923	3.76	275.5	purged dry 5 pm 15/12/16 clear ↓
1159	2	18.5	3.210	3.34	16962	3.75	281.1	
1201	3	18.5		3.32	16983	3.75	283.5	
<del>1202</del>	<del>4</del>							

**Field QA Checks:**  
 Air bubbles in vials? Y / N    Any violent reactions? Y / N  
 Decontamination as per GHD procedure? Y / N  
 Was sampling equipment pre-cleaned? Y / N  
 COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.	PFAS	Oxygen		
Preservatives	✓	✓								✓	✓		

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc  
1 green

**Purge Volumes**  
 Casing Int. Dia (mm) 50 100 150  
 Vol (L/m of casing) 2.0 7.9 17.7  
 \*Double for gravel pack





# Purging and Sampling Record

Bore ID: GW05

**Job Information**

Client: \_\_\_\_\_  
 Project: Albion Park  
 Proj. No.: 2125583  
 Sampler: JL/TG  
 Date: 16/12/2016  
 Round: \_\_\_\_\_

**Sampling Information**

Purge Method: per  
 Sample Method: low flow  
 WQ Meter Type: YSI  
 Flow Cell: Y / N Pump Depth: 4.5 m  
 WLevel Meter Type: Dip / Fox / Int.Fce / Gge  
 Field Filtered? Y / N (filter vessel, disposable filter, filter/syringe)

**Bore Information**

SWL(mbTOC): 2.815 m Logic Check: \_\_\_\_\_  
 Screen: From: \_\_\_\_\_ to: \_\_\_\_\_ m Stick Up: - m  
 NAPL Check: \_\_\_\_\_ Bore Diam.: 50 mm  
 Ref.datum: \_\_\_\_\_ Well Cap Secure? yes  
 Bore Depth: 6.20 m

Time (.....)	Volume (L)	Temp (°C)	SWL (m TOC)	Dis.Oxygen (.....)	Elec.Cond (.....)	pH (pH units)	Ox-Red Pt. (± mV)	Comment:
Stable when (3 consecutive readings):			stable	+/- 10%	+/- 3%	+/- 0.05 pH	+/- 10 mV	Colour, turbidity, sediment load, sheen, odour, flow rate, purged dry?
1113	2	18.8	3.100	3.13	10840	4.43	154.7	purged dry 430 pm 15/12/16. clear ↓
1127	3	18.7	3.550	2.75	11332	4.34	167.2	
1132	4	18.7	3.840	3.05	11069	4.39	165.9	

**Field QA Checks:**

Air bubbles in vials? Y / N Any violent reactions? Y / N  
 Decontamination as per GHD procedure? Y / N  
 Was sampling equipment pre-cleaned? Y / N  
 COC updated? Y / N

Parameters	BTEX	TPH	PAH	CHC	PCB	OCP	OPP	Tot. Metal	Biol.	PFAS			
Preservatives	✓	✓											

Comment: Duplicate samples collected, bottles used, access, condition of headworks etc

*Handwritten signature/initials*

**Purge Volumes**  
 Casing Int. Dia (mm) 50 100 150  
 Vol (L/m of casing) 2.0 7.9 17.7  
 \*Double for gravel pack



## Multi Parameter Water Meter



airmet

Air-Met Scientific Pty Ltd  
1300 137 067Instrument YSI Quatro Pro Plus  
Serial No. 10H100325

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

**Certificate of Calibration**

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

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. pH 7.00		pH 7.00		288773	pH 6.99
2. pH 4.00		pH 4.00		288994	pH 4.08
3. pH 10.00		pH 10.00		291176	pH 9.65
4. mV		229.6mV		OB1388/OB1390	229.3mV
5. EC		2.76mS		290786	2.76mS
6. D.O		0.00ppm		4347	0.00ppm
7. Temp		22.0°C		MultiTherm	21.8°C

Calibrated by: Lin Wang Lin Wang

Calibration date: 15/12/2016

Next calibration due: 14/01/2017

**Oil / Water Interface Meter**

**Instrument**      **Geotech Interface Meter (30M)**  
**Serial No.**      **4253**



**airmet**

Air-Met Scientific Pty Ltd  
 1300 137 067

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

### **Certificate of Calibration**

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

**Calibrated by:**

Jenny Shao

**Calibration date:**

14/12/2016

**Next calibration due:**

12/02/2017



## PID Calibration Certificate

Instrument      PhoCheck Tiger  
Serial No.      T-105759



Air-Met Scientific Pty Ltd  
1300 137 067

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

### Certificate of Calibration

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

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No	Instrument Reading
PID Lamp		98ppm Isobutylene	NATA	SY137	98.4ppm

Calibrated by:  Joanna Wong

Calibration date: 2/12/2016

Next calibration due: 1/01/2017

## **Appendix F** – Borehole logs



# BOREHOLE LOG

## ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW01

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 06/12/2016 - 06/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA, PT & SFA <b>Total Depth (m)</b> 6 <b>Diameter (mm)</b> 125	<b>Easting, Northing</b> 297398.909, 6173432.014 <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> 6.168 <b>Collar RL</b> 6.17 <b>Logged By</b> Matt West <b>Checked By</b>
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B.C.L No. N/A	Casing PVC (Class 18)	Screen 0.5mm Slotted PVC (Class 18)	Surface Completion Gatic
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.5	HA	all samples <1 ppm	GW01_0.0_0.1				silty SAND, fine, pale brown brown (possible FILL)	D	L		6
0.5	PT		GW01_0.5_0.6					CLAY, medium plasticity, pale brown mottled pale grey (NATURAL - SOIL)	SM	ST	
1.0			GW01_1.0_1.1								5
1.5						Grout					4.5
2.0			GW01_2.0_2.1								4
2.5										3.5	
3.0		GW01_3.0_3.1								3	
3.5					Bentonite					2.5	
4.0		GW01_4.0_4.1					gravelly CLAY, low plasticity, orange and pale grey, fine and coarse gravel (NATURAL - SOIL)	M	VST	iron oxide staining	2
4.5											1.5
5.0		GW01_5.0_5.1			Gravel						1
5.5	SFA										0.5
6.0							Termination Depth at 6.00 m. Target depth achieved.				0
6.5											-0.5
7.0											-1
7.5											-1.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b>	<b>Moisture Abbreviations</b>	<b>Consistency Abbreviations</b>	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

## ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW02

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 06/12/2016 - 06/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA, PT & SFA <b>Total Depth (m)</b> 6.5 <b>Diameter (mm)</b> 125	<b>Easting, Northing</b> 297323.906, 6173479.98 <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> 6.27 <b>Collar RL</b> 6.293 <b>Logged By</b> Matt West <b>Checked By</b>
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B.C.L No. N/A	Casing PVC (Class 18)	Screen 0.5mm Slotted PVC (Class 18)	Surface Completion Gatic
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.5	HA	all samples <1 ppm	GW02_0.0_0.2				silty SAND, fine, pale brown (possible FILL)	SM	L		6
0.5			GW02_0.5_0.6 (BD2_061216)				sandy CLAY, low plasticity, dark orange-brown, medium to coarse sand (FILL)	SM	VST		5.5
1.0	PT		GW02_1.0_1.1				CLAY, medium to high plasticity, pale grey mottled brown (NATURAL - SOIL)	SM	ST		5
2.0			GW02_2.0_2.1		Grout						4.5
3.0			GW02_3.0_3.1								4
4.0			GW02_4.0_4.1		Bentonite						3.5
5.0	SFA		GW02_5.0_5.1								3
5.5			GW02_6.0_6.1		Gravel		sandy CLAY, low plasticity, pale grey mottled pale brown (NATURAL - SOIL)	M	ST		2.5
6.5							Termination Depth at 6.50 m. Target depth achieved.				2
7.0											1.5
7.5											1
											0.5
											0
											-0.5
											-1
											-1.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b>	<b>Moisture Abbreviations</b>	<b>Consistency Abbreviations</b>	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

## ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW03

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 07/12/2016 - 07/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA & PT <b>Total Depth (m)</b> 6.4 <b>Diameter (mm)</b> 125	<b>Easting, Northing</b> 297393.098, 6173559.972 <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> 5.4 <b>Collar RL</b> 5.398 <b>Logged By</b> Matt West <b>Checked By</b>
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B.C.L No. N/A	Casing PVC (Class 18)	Screen 0.5mm Slotted PVC (Class 18)	Surface Completion Gatic
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.5	HA	all samples <1 ppm	GW03_0.0_0.1				silty SAND, medium, dark brown	D	F		5
			GW03_0.5_0.6				sandy CLAY, low to medium plasticity, pale brown (NATURAL - SOIL)				4.5
1.0	PT		GW03_1.0_1.1		Grout		CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	SM	ST		4
2.0			GW03_2.0_2.1								3.5
2.5					Bentonite						3
3.0			GW03_3.0_3.1								2.5
4.0			GW03_4.0_4.1								1.5
4.5							CLAY, medium plasticity, pale grey, some fine sand (NATURAL - SOIL)	VM	ST		1
5.0			GW03_5.0_5.1		Gravel						0.5
5.5							sandy CLAY, low plasticity, pale grey pale brown (NATURAL - SOIL)	M	S		0
6.0			GW03_6.1_6.2								-0.5
6.5							Termination Depth at 6.40 m. Target depth achieved.				-1
7.0											-1.5
7.5											-2
											-2.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b>	<b>Moisture Abbreviations</b>	<b>Consistency Abbreviations</b>	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

## ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW04

Page 1 of 1

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 08/12/2016 - 07/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA & PT <b>Total Depth (m)</b> 6.2 <b>Diameter (mm)</b> 125	<b>Easting, Northing</b> 297307.563, 6173658.845 <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> 5.041 <b>Collar RL</b> 5.036 <b>Logged By</b> Matt West <b>Checked By</b>
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B.C.L No. N/A	Casing PVC (Class 18)	Screen 0.5mm Slotted PVC (Class 18)	Surface Completion Gatic
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.5	HA	all samples <1 ppm	GW04_0.0_0.1				silty SAND, medium, dark brown				5
0.5			GW04_0.5_0.6				CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	SM	F		4.5
1.0	PT		GW04_1.0_1.1		Grout						4
1.5											3.5
2.0			GW04_2.0_2.1								3
2.5					Bentonite						2.5
3.0			GW04_3.0_3.1								2
3.5											1.5
4.0			GW04_4.0_4.1								1
4.5							CLAY, medium plasticity, pale grey, some fine sand (NATURAL - SOIL)	VM	ST		0.5
5.0			GW04_5.0_5.1				sandy CLAY, medium plasticity, fine, pale grey pale brown (NATURAL - SOIL)	M	F		0
5.5											-0.5
6.0			GW04_6.1_6.2		Gravel		CLAY, medium plasticity, pale grey mottled pale brown, some ferrous nodules (NATURAL - SOIL)	VM	VST		-1
6.5							Termination Depth at 6.20 m. Target depth achieved.				-1.5
7.0											-2
7.5											-2.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b> AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	<b>Moisture Abbreviations</b> D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Consistency Abbreviations</b> <b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense <b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard
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# BOREHOLE LOG

## ENVIRONMENTAL-GROUNDWATER

MONITORING WELL GW05

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 08/12/2016 - 08/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA, PT & SFA <b>Total Depth (m)</b> 6 <b>Diameter (mm)</b> 125	<b>Easting, Northing</b> 297258.293, 6173898.098 <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> 4.803 <b>Collar RL</b> 4.814 <b>Logged By</b> Matt West <b>Checked By</b>
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B.C.L No. N/A	Casing PVC (Class 18)	Screen 0.5mm Slotted PVC (Class 18)	Surface Completion Gatic
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.5	HA	all samples <1 ppm	GW05_0.0_0.1				silty SAND, fine to coarse, dark brown, with coarse gravel (FILL)	D	D		4.5
			GW05_0.5_0.6								4
1.0	PT		GW05_1.0_1.1				silty CLAY, low plasticity, dark grey, with organics, with peat (NATURAL - SOIL)	M	VS	distinct organic odour	3.5
1.5			GW05_1.6_1.7		Grout						3
2.0							CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	M	ST		2.5
2.5			GW05_2.8_2.9			2					
3.0											1.5
3.5			GW05_3.4_3.5		Bentonite	1					
4.0	SFA										0.5
4.5											0
5.0			GW05_5.0_5.1		Gravel						-0.5
5.5						-1					
6.0			GW05_5.9_6				Termination Depth at 6.00 m. Target depth achieved.				-1.5
6.5											-2
7.0											-2.5
7.5											-3

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b>	<b>Moisture Abbreviations</b>	<b>Consistency Abbreviations</b>	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard





# BOREHOLE LOG

SOIL BORE SB06

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 06/12/2016 - 06/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA & PT <b>Total Depth (m)</b> 6 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)	
0.0	HA	all samples <1 ppm	SB06_0.0_0.15			silty SAND, fine, poorly graded, pale brown, some gravel, coarse gravel (FILL) sandy GRAVEL, medium to high plasticity, medium to coarse, dark brown, some silt (FILL)	SM	L		-0.5	
0.5			SB06_0.5_0.6				D	MD			
1.0	PT		SB06_1.0_1.1			CLAY, medium to high plasticity, pale grey with pale orange-brown (NATURAL - SOIL)	SM	ST		-1.0	
1.5											-1.5
2.0			SB06_2.0_2.1								-2.0
2.5											-2.5
3.0			SB06_3.0_3.1								-3.0
3.5										-3.5	
4.0			SB06_4.0_4.1							-4.0	
4.5										-4.5	
5.0			SB06_5.0_5.1							-5.0	
5.5										-5.5	
5.5			SB06_5.9_6.0			sandy CLAY, pale grey mottled pale brown, fine to medium sand (NATURAL - SOIL)	M	ST		-5.5	
6.0						Termination Depth at 6.00 m. Target depth achieved.				-6.0	
6.5										-6.5	
7.0										-7.0	
7.5										-7.5	

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB07

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 05/12/2016 - 02/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> CC, HA, PT and SFA <b>Total Depth (m)</b> 6 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	CC HA	all samples <1 ppm	SB07_0.0_0.03			ASPHALT	SM	VD	Ashpalt sample collected	-0.5
0.05			SB07_0.05_0.1			sandy GRAVEL, coarse, poorly graded, angular, dark grey- (FILL)				
1.0	PT		SB07_1.0_1.1			silty CLAY, medium to high plasticity, mottled brown-grey	M	ST		-1
2.0			SB07_2.0_2.1			dayey SAND, medium to coarse, poorly graded, pale grey- (NATURAL - SOIL)	M	D		-2
3.0			SB07_3.0_3.1			CLAY, pale grey- mottled pale brown-, subrounded, fine to medium, poorly graded gravel (NATURAL - SOIL)	M	ST		-3
4.0	SFA		SB07_3.9_4							-4
5.0			SB07_5.0_5.1							-5
6.0			SB07_5.9_6							-6
6.0						Termination Depth at:6.00 m. Target depth achieved.				-6

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB08

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 05/12/2016 - 05/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 6.7 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)	
0.0	HA	all samples <1 ppm	SB08_0.0_0.15_477 (BD1_05122016)			silty SAND, fine, brown (FILL)	D	L		-0.5	
0.5			SB08_0.5_0.6			sandy GRAVEL, medium to coarse, poorly graded, angular, brown- grey (FILL)	D	VD		-1.0	
1.0	PT		SB08_1.0_1.1			CLAY, medium to high plasticity, pale brown mottled pale grey (NATURAL - SOIL)	VM	VST		-1.5	
1.5											-2.0
2.0			SB08_2.0_2.1								-2.5
2.5											-3.0
3.0		SB08_3.0_3.1							-3.5		
3.5									-4.0		
4.0		SB08_4.0_4.1							-4.5		
4.5									-5.0		
5.0		SB08_5.0_5.1				CLAY, low to medium plasticity, pale brown mottled pale grey, some fine to medium sand (NATURAL - SOIL)	VM	VST		-5.5	
5.5									-6.0		
6.0		SB08_5.9_6				sandy CLAY, low to medium plasticity, pale brown mottled pale grey, fine to medium sand (NATURAL - SOIL)	VM	ST		-6.5	
6.5									-7.0		
7.0						Termination Depth at 6.70 m. Target depth achieved.				-7.5	

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense <b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

## ENVIRONMENTAL-SOIL BORE

**SOIL BORE SB09**

Page 1 of 1

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 06/12/2016 - 06/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 5.9 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	HA	all samples <1 ppm	SB09_0.0_0.1		XXXX	dayey SAND, medium, poorly graded, dark brown, some silt (FILL)	VM	L		
0.5			SB09_0.5_0.6		/ / / / /	silty CLAY, medium to high plasticity, dark brown (NATURAL - SOIL)	VM	F		-0.5
1.0	PT		SB09_1.0_1.1		- - - - -	sandy CLAY, dark orange mottled pale grey (NATURAL - SOIL)	SM	ST		-1.0
2.0			SB09_2.0_2.1		- - - - -	CLAY, medium to high plasticity, pale grey with pale orange- brown (NATURAL - SOIL)	SM	ST		-2.0
3.0			SB09_3.0_3.1		- - - - -					-3.0
4.0			SB09_4.0_4.1		- - - - -					-4.0
5.0			SB09_5.0_5.1		- - - - -					-5.0
5.5			SB09_5.8_5.9		- - - - -	sandy CLAY, pale grey, fine to medium sand (NATURAL - SOIL)	M	ST		-5.5
6.0						Termination Depth at:5.90 m. Target depth achieved.				-6.0
6.5										-6.5
7.0										-7.0
7.5										-7.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

<b>Drilling Abbreviations</b>	<b>Moisture Abbreviations</b>	<b>Consistency Abbreviations</b>	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB10

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 06/12/2016 - 06/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 5.2 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)		
0.0	HA	all samples <1 ppm	SB10_0.0_0.1			silty SAND, fine, poorly graded, brown (FILL) CLAY, medium to high plasticity, dark brown with pale grey (NATURAL - SOIL)	D	L		-0.5		
0.5	PT		SB10_0.5_0.6				SM	F				
1.0			SB10_1.0_1.1									-1.0
1.5												-1.5
2.0			SB10_2.0_2.1				sandy CLAY, low plasticity, medium to coarse, pale orange mottled pale grey (NATURAL - SOIL)	M			F	-2.0
2.5							CLAY, pale grey, fine to medium sand (NATURAL - SOIL)	SM			ST	-2.5
3.0		SB10_3.0_3.1						-3.0				
3.5								-3.5				
4.0		SB10_4.0_4.1						-4.0				
4.5								-4.5				
5.0		SB10_5.1_5.2						-5.0				
5.5						Termination Depth at 5.20 m. Target depth achieved.			-5.5			
6.0									-6.0			
6.5									-6.5			
7.0									-7.0			
7.5									-7.5			

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB11

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 07/12/2016 - 07/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA, PT and SFA <b>Total Depth (m)</b> 5.5 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PI (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	HA	all samples <1 ppm	SB11_0.0_0.1			silty SAND, medium, dark brown silty CLAY, low to medium plasticity, brown (NATURAL - SOIL)	D	F		-0.5
0.5	PT		SB11_0.5_0.6							
1.0	SFA		SB11_1.0_1.1			SAND, medium to high plasticity, medium to coarse, dark grey mottled dark orange- brown, trace clay, moderate to strong cementation (NATURAL - SOIL)	D	VD		-1.0
1.5										
2.0										-1.5
2.5										-2.0
3.0	PT		SB11_3.0_3.1							-3.0
3.5	SFA									-3.5
4.0										-4.0
4.5										-4.5
5.0										-5.0
5.5			SB11_5.4_5.5							-5.5
6.0						Termination Depth at 5.50 m. Target depth achieved.				-6.0
6.5										-6.5
7.0										-7.0
7.5										-7.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard





# BOREHOLE LOG

SOIL BORE SB12

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 07/12/2016 - 07/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 5.7 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	HA	all samples <1 ppm	SB12_0.0_0.1 (BD3_071216)			silty SAND, medium, dark brown				
0.5			SB12_0.5_0.6			silty CLAY, low to medium plasticity, brown (NATURAL - SOIL)	D	F		-0.5
1.0	PT		SB12_1.0_1.1			CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	SM	ST		-1.0
2.0			SB12_2.0_2.1							-2.0
4.0			SB12_4.0_4.1							-4.0
4.5						CLAY, medium plasticity, pale grey, some fine sand (NATURAL - SOIL)	VM	ST		-4.5
5.5			SB12_5.6_5.7			sandy CLAY, low plasticity, pale grey pale brown (NATURAL - SOIL)	M	S		-5.5
6.0						Termination Depth at:5.70 m. Target depth achieved.				-6.0
6.5										-6.5
7.0										-7.0
7.5										-7.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense <b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB13

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 07/12/2016 - 07/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA, PT and SFA <b>Total Depth (m)</b> 4 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)	
0.0	HA	all samples <1 ppm	SB13_0.0_0.1			silty SAND, fine, pale brown (possible FILL)	D	L		-0.5	
0.5			SB13_0.5_0.6								
1.0	PT		SB13_1.0_1.1								
1.5						CLAY, low to medium plasticity (NATURAL - SOIL)	SM	ST		-1.0	
2.0											
2.5	SFA										
2.5						dayey SAND, medium to coarse, dark grey and brown, some fine gravel, moderate to strong cementation (NATURAL - SOIL)	M	VD		-2.0	
3.0											
3.5											
3.5						CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	M	ST		-3.5	
4.0											
4.0				Termination Depth at:4.00 m. Target depth achieved.							
4.5											-4.5
5.0											-5.0
5.5											-5.5
6.0											-6.0
6.5											-6.5
7.0											-7.0
7.5											-7.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

## ENVIRONMENTAL-SOIL BORE

SOIL BORE SB14

Page 1 of 1

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 08/12/2016 - 08/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 6 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)	
0.0	HA	all samples <1 ppm	SB14_0.0_0.1		[Dotted pattern]	silty SAND, medium, dark brown					
0.5	PT		SB14_0.5_0.6 (BD4_081216)		[Diagonal lines]	silty CLAY, low plasticity, brown, some fine sand (NATURAL - SOIL)	D	ST		-0.5	
1.0			SB14_1.0_1.1		[Diagonal lines]	CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	SM	F		-1.0	
2.0			SB14_2.0_2.1		[Diagonal lines]						-2.0
3.0			SB14_3.0_3.1		[Diagonal lines]						-3.0
5.0			SB14_5.0_5.1		[Diagonal lines]		sandy CLAY, medium plasticity, fine, pale grey pale brown (NATURAL - SOIL)	M	F		-5.0
6.0			SB14_5.9_6		[Diagonal lines]	Termination Depth at:6.00 m. Target depth achieved.				-6.0	
6.5										-6.5	
7.0										-7.0	
7.5										-7.5	

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	<b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



# BOREHOLE LOG

SOIL BORE SB15

ENVIRONMENTAL-SOIL BORE

<b>Client</b> Fire & Rescue NSW <b>Project</b> Albion Park FRNSW Site Investigation <b>Project No.</b> 212558302 <b>Site</b> Albion Park FRNSW <b>Location</b> Airport Road, Albion Park Rail, NSW 2527 <b>Date Drilled</b> 08/12/2016 - 08/12/2016	<b>Drill Co.</b> BG Drilling Pty Ltd <b>Driller</b> Luke <b>Rig Type</b> Hanjin D&B 8-D <b>Drill Method</b> HA and PT <b>Total Depth (m)</b> 5.7 <b>Diameter (mm)</b> 125	<b>Easting</b> <b>Northing</b> <b>Grid Ref</b> GDA94_MGA_zone_56 <b>Elevation</b> <b>Logged By</b> Matt West <b>Checked By</b>
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Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials, separate phase liquids, imported fill, ash.	Elevation (m)
0.0	HA	all samples <1 ppm	SB15_0.0_0.1			silty SAND, medium, dark brown CLAY, medium to high plasticity, pale grey mottled pale brown (NATURAL - SOIL)	SM	F		-0.5
0.5	PT		SB15_0.5_0.6 (BD4_081216)							
1.0			SB15_1.0_1.1							
1.5										
2.0			SB15_2.0_2.1							
2.5										
3.0			SB15_3.0_3.1							
3.5										
4.0			SB15_4.0_4.1							
4.5										
5.0		SB15_5.0_5.1				sandy CLAY, medium plasticity, fine, pale grey pale brown (NATURAL - SOIL)	M	F		-5.0
5.5		SB15_5.5_5.6								-5.5
6.0						Termination Depth at:5.70 m. Target depth achieved.				-6.0
6.5										-6.5
7.0										-7.0
7.5										-7.5

**Notes**

**GHD Soil Classifications** The GHD Soil Classification is based on Australian Standards AS 1726-1993. This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	<b>Granular Soils</b> VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense <b>Cohesive Soils</b> VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

## **Appendix G** – Assessment of data quality

# Quality Assurance and Quality Control Report

## Data Quality Indicators

Data generated during this investigation must be appropriate to allow decisions to be made with confidence. Specific limits for this investigation have been adopted in accordance with guidance from the AS4482.1 which includes appropriate indicators of data quality (data quality indicators [DQIs] used to assess QA/QC, and GHD's Standard Field Operating Procedures).

To assess the usability of the data prior to making decisions, the data is assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, will be reviewed at the completion of the investigation works to assess for the presence of decision errors.

The pre-determined DQIs established for the investigation are discussed below and shown in Table 1.

- Precision - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percentage Difference (RPD) of duplicate samples.
- Accuracy - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this investigation is a measure of the closeness of the analytical results obtained by a method to the 'true' (or standard) value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- Comparability - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- Completeness - is defined as the percentage of measurements made which are judged to be valid measurements.

**Table 1 Summary of quality assurance / quality control criteria for groundwater**

Data quality indicator	Frequency	Data quality acceptance criteria
<b>Precision</b>		
Inter/ intra duplicates	1 / 10 samples	<30-50% RPD
<b>Accuracy</b>		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	<LOR
Matrix spikes	1 per lab batch	70-130%
<b>Representativeness</b>		
Sampling appropriate for media and analytes	All samples	-
Samples extracted and analysed within holding times	All samples	Organics (7-14 days) Inorganics (6 months)

Data quality indicator	Frequency	Data quality acceptance criteria
		Some exceptions to these holding times are listed below <sup>(1)</sup>
LORs appropriate and consistent	All samples	All samples
<b>Comparability</b>		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Standard operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
<b>Completeness</b>		
Sample description and COCs completed and appropriate	All Samples	All Samples
Appropriate documentation	All Samples	All Samples
Satisfactory frequency and result for QA/QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid
<b>Acronyms</b>		
COC: Chain of Custody		
LOR: Limit of Reporting		
QA/QC: Quality assurance / quality control		

<sup>1</sup> Holding times with exception to the above include:

If any of the DQIs are not met, further investigation will be necessary to determine whether the non-conformance will significantly affect the usefulness of the data.

## Field quality assurance and quality control

The quality assurance/quality control (QA/QC) procedures are based on NSW EPA *Guidelines for the Site Auditor Scheme* (2006) and AS 4482.1 – 2005 and AS 4482.2 – 1999.

QA involves all the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples and accuracy and reliability of analytical results (NEPC 2013). QC involves protocols to monitor and measure the effectiveness of QA procedures.

All fieldwork was conducted with reference to the Australian Standards AS 4482.1 – 2005 and AS 4482.2 – 1999 and GHD's Standard Field Operating Procedures, which ensure all samples, are collected by a set of uniform and systematic methods, as required by GHD's QA system. Key requirements of these procedures are listed below:

- Decontamination procedures – including washing and rinsing of re-useable equipment, the use of new disposable gloves and sampling tubing between each sampling location and the use of sampling containers provided by the laboratory.
- Sample identification procedures - samples were immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers were clearly labelled with a sample number, job number, and sample date. The sample containers were then transferred to a chilled insulated container for sample preservation prior to and during shipment to the analytical laboratory.



- Chain of custody information requirements - a chain of custody form was completed and forwarded to the testing laboratory with the samples.
- Inter and intra duplicate and sample frequency.
- Calibration was undertaken by the rental supplier and certificates are provided in Appendix E.
- Field instrument field checks were undertaken on the equipment:
  - Interface probe: A daily equipment check was undertaken to ensure that the equipment worked correctly when immersed in water and that it has had no unauthorised repairs.
  - Low flow pump: The low flow sampling equipment was provided by the equipment supplier in good working condition. The equipment was inspected by GHD at the start of each day to ensure that all parts of the equipment were in good working order. GHD measured the rate of water discharge during purging to ensure that the rate did not exceed 1 L per minute. Purge volumes were recorded on the groundwater sampling field sheets for each site.

### **Groundwater sampling and analysis quality control**

The QC samples collected during the investigation are described below.

- Intra laboratory duplicate: Intra duplicates are used to identify the variation in the analyte concentration between samples from the same sampling point and the repeatability of the laboratory's analysis.
- Inter laboratory duplicate: Inter duplicates provide an indication of the repeatability of the results between laboratories.

**Table 2 Quality control (QC) sampling frequency**

Sample	Recommended sampling rate	Media	No. QC samples	No. of primary samples	Total
Intra	1/10 samples	Soil	1	46	48
Inter	1/10 samples		1		
Intra	1/10 samples	Groundwater	1	5	6
Intra	1/10 samples	Surface water	1	5	6
Intra	1/10 samples	Sediment	1	5	6

- Two soil trip blanks and one water trip blank accompanied the samples to the laboratory. All trip blanks were less than the limit of detection of the laboratory.
- Four rinsates were collected during the soil sampling on each day from hand tools used during the investigation. All rinsates were less than the limit of detection of the laboratory.
- Three trip spikes were collected during the investigation. The water trip spike and trip spikes 1 and 2 for within the 70-130 % recovery. However, there were some outlier in Trip spike 7 (soil)

### **Relative percentage difference calculations**

Relative percentage difference (RPD) calculations are used to assess how closely primary and inter/intra duplicate sample results match. RPDs are a quantitative measure of the accuracy of the analytical results and are calculated in accordance with the procedure described in AS 4482.1 – 2005 (Standards Australia 2005). According to AS 4482.1 – 2005 typical RPDs are expected to range between 30% and 50%; however, this may be higher for organics and for low

concentrations of analytes. GHD adopts 30% for inorganics and 50% for organics as the general assessment criteria.

Where a result is below the laboratory limit of reporting (LOR) for one of the paired samples, the concentration assigned to that sample is the LOR. Where both results are reported below laboratory LOR the RPD is not calculated.

The QC samples analysed during the groundwater investigation are listed in Table 3.

**Table 3 Analysed quality control (QC) samples**

Primary sample	Duplicate type	QC sample laboratory ID	QC sample field ID	Date sampled	Lab report number	Matrix
SB08_0.0_0.15	Intra	ES1628401057	BD1_051216	5/12/2016	ES1628401	Soil
SB12_0.0_0.1	Inter	ES1628401086	BD3_071216	7/12/2016	527586	Soil
SS05	Intra	ES1629123006	SSQA2	16/12/2016	ES1629123	Soil
SW05	Intra	ES1629123011	SWQA1	16/12/2016	ES1629123	Water
GW01	Intra	ES1629123013	GWQA3	16/12/2016	ES1629123	Water

RPD exceedances were reported during this investigation.

BD1\_051216 – Primary sample SB08\_0.0\_0.15 – Copper 72%

BD3\_071216 – Primary sample SB12\_0.0\_0.1 – Perfluorooctane sulfonic acid (PFOS) 54%

SSQA2 – Primary sample SS05:

- Perfluorohexane sulfonic acid (PFHxS) 94%
- Perfluorooctanoic acid (PFOA) 72%
- Perfluorooctane sulfonic acid (PFOS) 89%

GW01 – Primary sample GWQA3 – Cations Total 173%

### Laboratory quality assurance / quality control

Laboratory methods used by the primary laboratory were suitable for environmental contaminant analysis and are based on established internationally recognised procedures such as those published by the United States Environmental Protection Agency (US EPA), American Public Health Association (APHA), AS and National Environment Protection (Assessment of Site Contamination) Measure (NEPM).

The individual testing laboratory conducted an assessment of the laboratory QC program however the results were also independently reviewed and assessed internally by GHD. Recovery targets below are defined in the ALS QA/QC section of the certificates of analysis reports. All laboratory QA/QC results are documented with the laboratory certificates of analysis in the appendices of the relevant site report.

#### Laboratory quality control procedures

Laboratory QC samples incorporated in the analytical process include:

### **Laboratory blind duplicate samples**

A laboratory blind duplicate provides data on the analytical precision and reproducibility of the analytical result. The laboratory blind duplicate is created by sub sampling from one of the primary samples submitted for analysis. Laboratory blind duplicates are analysed at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch.

The permitted ranges for the RPD of laboratory blind duplicates are dependent on the magnitude of the results in comparison to the level of reporting as shown in Table 4.

**Table 4 Permitted laboratory blind duplicate relative percentage difference (RPD) ranges**

Magnitude of result	Permitted RPD range
< 10 x limit of reporting (LOR)	No limits
10 – 20 x LOR	0% - 50%
> 20 x LOR	0% - 30%

### **Matrix spike recoveries**

Matrix spike sample analysis is the analysis of one or more replicate portions of samples from the batch, after fortifying the additional portion(s) with known quantities of the analyte(s) of interest. The percentage recovery of target analyte(s) from matrix spike samples is used to determine the bias of the method in the specific sample matrix. Recoveries must lie between 70% and 130%.

### **Laboratory control sample**

The laboratory control sample (LCS) analysis of either a reference material or a control matrix fortified with analytes representative of the analyte class. The purpose of LCS is to monitor method precision and accuracy independent of the sample matrix. Typically, the percentage recovery of the LCS is compared to the dynamic recovery limit based on the statistical analysis of the processed LCS analysis. The ALS acceptance criteria, indicates recoveries must lie between 70% and 130%.

### **Surrogate spike recoveries**

Surrogate Spikes provide a means of checking that no gross errors have occurred during any stage of the analytical method leading to significant analyte loss. Surrogate recoveries are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. Surrogate compounds are spiked into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. Recoveries must lie between 50% and 150% for all analytes.

### **Method blank samples**

Method or analysis blank sample analysis is the analysis of a sample that is as free as possible of the analytes of interest, but has been prepared the same manner as the samples under investigation. The analysis is to ascertain if laboratory reagent, glassware and other laboratory consumables contribute to the observed concentration of analytes in the process batch. If below the maximum acceptable method blank (20% of the practical quantification limit), the contribution is subtracted from the gross analytical signal for each analysis before calculating the sample analyte concentration. The method blank should return analyte concentrations as 'not detected'.

The individual testing laboratory conducted an assessment of the laboratory QC program internally. However, the results were also independently reviewed and assessed by GHD.

### Laboratory quality control results

Laboratory RPDs, matrix spike, LCSs and method blanks were within the ALS acceptable ranges with the exception in Table 5.

**Table 5 Summary of outliers**

Laboratory report	Quality Control Sample	Analytes	Sample Code	results	Comment
ES1628401	LCSs - soil	TOC	QC-689655-002	100% (81-99% limits)	Recovery greater than upper control limit
	LCS - water	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	Anonymous	Not determined	MS recovery not determined. Background level greater than or equal to 4x spike level.
	Regular Sample Surrogates	PAH surrogates – 2-Fluorobiphenyl	SB14-2.0-2.1	125% (70-122% limits)	Recovery greater than upper data quality objective
	Frequency of quality control samples	Exchangeable cations with pre-treatment	-	0 (expected 5)	-
ES1629123	LCS – soil	TOC	QC-697532-002	99.3% (81-99% limits)	Recovery greater than upper control limit
	Frequency of quality control samples	2 x Laboratory dups and 2 x Matrix Spikes		0 (expected 10) 0 (expected 5)	
ES1700845	Matrix Spikes	Perfluorohexane sulfonic acid (PFHxS)	GW03_0.0-0.1	Not determined	MS recovery not determined. Background level greater than or equal to 4x spike level.
		Perfluorooctane sulfonic acid (PFOS)	Anonymous		
		Perfluorooctane sulfonic acid (PFOS)	GW03_0.0-0.1		
ES1701294	Matrix Spike	Perfluorooctane sulfonic acid (PFOS)	MW02_1.0-1.1	Not determined	MS recovery not determined. Background level greater than or equal to 4x spike level.

### **Sample holding times**

All samples were extracted and analysed by the laboratory within holding times.

ES1628401 – SB06\_2.0-2.1 Organic matter was 1 day overdue

### **Sample preservation**

Laboratory report 527586 detailed that appropriately preserved sample container was not used. The sample was collected in an approved ALS sample jar and therefore is acceptable.

Laboratory report ES1629123 detailed all samples were 2 days overdue for pH analysis.

### **Evaluation of DQI**

To minimise the potential for decision errors, the sampling and analysis program completed at the site by GHD has been evaluated with consideration of the Data Quality Indicators (DQIs) described in **Section 3** namely representativeness, completeness, comparability, precision and accuracy.

- **Data representativeness:** The sampling methodology ensured all environmental samples were collected by a set of uniform and systematic methods. Laboratory and field QA/QC procedures were carried out to ensure data representativeness. All samples were provided to the laboratory with adequate preservation and in compliant containers as stated in the laboratory sample receipt documentation. Consequently, data representativeness is considered to have been satisfied.
- **Completeness:** It is considered that the field QA/QC procedures carried out such as blind duplicate collection frequencies and the analytes tested provide completeness in terms of the required number of field duplicate samples. Laboratory QA/QC sample analysis is considered sufficient to provide a complete overview of QA/QC procedures.
- **Precision:** Field blind duplicate results reported RPDs below the adopted criterion (30% for inorganics and 50% for organics). GHD therefore considers that laboratory results are acceptable for interpretation in this report.
- **Accuracy:** Environmental sampling procedures ensured that collection, preservation and laboratory analytical techniques are appropriate for analysis of environmental contaminants.
- **Comparability:** All field work was conducted with reference to the Australian Standards, which ensured all environmental samples were collected by a set of uniform and systematic methods, as required by GHD's QA system. GHD considers that the laboratory data are of a suitable quality for assessing the environmental status of the site.

Laboratory report ES1629123 was re-analysed for the full PFAS suite and the results were reported under a new laboratory report ES1701791. The results between the two reports showed some large discrepancies at the same locations. As a result of these discrepancies the laboratory run duplicate analysis on some of the samples and confirmed the results from the second laboratory report ES1701791. Therefore the PFAS results from laboratory report ES1629123 have not been discussed in this report.

The overall review of the QC results from the primary and secondary laboratories indicates that the current analytical data are of an acceptable quality upon which to draw meaningful conclusions regarding impacts at the site as part of this investigation.



**Appendix G  
Table G1  
Soil Duplicate Table**

Fire Rescue NSW  
Albion Park FRNSW  
Albion Park FRNSW Site Investigation

Field Duplicates (soil)  
Filter: ALL

SDG Field ID Sampled Date/Time	ALSE-Sydney 09-Dec-16 SB08_0_0_0.15 5/12/2016	ALSE-Sydney 09-Dec-16 BD1_051216 5/12/2016	RPD	ALSE-Sydney 09-Dec-16 SB12_0_0_0.1 7/12/2016	12-Dec-16 BD3_071216 7/12/2016	RPD
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Chem_Group	ChemName	Units	EQL						
Inorganics	Moisture	%	1	9.7	9	7			
Metals	Arsenic	mg/kg	5 : 2 (Interlab)	<5	<5	0	<5	<2	0
	Cadmium	mg/kg	1 : 0.4 (Interlab)	<1	<1	0	<1	<0.4	0
	Chromium (III+VI)	mg/kg	2 : 5 (Interlab)	17	9	62	24	22	9
	Copper	mg/kg	5	<b>30</b>	<b>64</b>	<b>72</b>	12	15	22
	Lead	mg/kg	5	12	10	18	13	18	32
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	2 : 5 (Interlab)	7	5	33	6	5.2	14
	Zinc	mg/kg	5	17	28	49	9	14	43
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0
	C6 - C10 Fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0
	>C10-C16 minus Naphthalene (F2)	mg/kg	50	<50	<50	0	<50	<50	0
	>C10 - C16 Fraction	mg/kg	50	<50	<50	0	<50	<50	0
	>C16 - C34 Fraction (F3)	mg/kg	100	<100	<100	0	<100	<100	0
	>C34 - C40 Fraction (F4)	mg/kg	100	<100	<100	0	<100	<100	0
	>C10 - C40 (Sum of Total)	mg/kg	50	<50	<50	0	<50	<50	0
TRH - NEPM 1999	C6 - C 9 Fraction	mg/kg	10 : 20 (Interlab)	<10	<10	0	<10	<20	0
	C10 - C14 Fraction	mg/kg	50 : 20 (Interlab)	<50	<50	0	<50	<20	0
	C15 - C28 Fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	C29 - C36 Fraction	mg/kg	100 : 50 (Interlab)	<100	<100	0	<100	<50	0
	C10 - C36 (Sum of Total)	mg/kg	50	<50	<50	0	<50	<50	0
BTEX & MAH	Benzene	mg/kg	0.2 : 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.1	0
	Toluene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0
	Ethylbenzene	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0
	Xylene (o)	mg/kg	0.5 : 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.1	0
	Xylene (m & p)	mg/kg	0.5 : 0.2 (Interlab)	<0.5	<0.5	0	<0.5	<0.2	0
	Xylene Total	mg/kg	0.5 : 0.3 (Interlab)	<0.5	<0.5	0	<0.5	<0.3	0
	BTEX (Sum of Total) - Lab Calc	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0
PAH	Polycyclic aromatic hydrocarbons	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(b)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Chrysene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Fluorene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Naphthalene	mg/kg	1 : 0.5 (Interlab)	<1	<1	0	<1	<0.5	0
	Naphthalene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
SVOCs	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	1.2	1.2	0	1.2	1.2	0
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	0.6	0.6	0	0.6	0.6	0
PFAS	Perfluorodecanesulfonic acid (PFDS)	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0
	4:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)				<0.0005	<0.005	0
	Perfluorobutane sulfonic acid	mg/kg	0.0002 : 0.005 (Interlab)				0.0032	<0.005	0
	Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002 : 0.005 (Interlab)				0.0111	0.007	45
	Perfluoropentanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				0.0021	<0.005	0
	8:2 Fluorotelomer sulfonic acid	mg/kg	0.0005 : 0.005 (Interlab)				<0.0005	<0.005	0
	N-Ethyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.01 (Interlab)				<0.0005	<0.01	0
	N-Methyl perfluorooctane sulfonamide	mg/kg	0.0005 : 0.01 (Interlab)				<0.0005	<0.01	0
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0005 : 0.01 (Interlab)				<0.0005	<0.01	0
	Perfluorooctanoic acid (PFOA)	mg/kg	0.0002 : 0.005 (Interlab)				0.0004	<0.005	0
	Perfluorobutanoic acid	mg/kg	0.001 : 0.005 (Interlab)				<0.001	0.006	143
	Perfluorodecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0
	Perfluorododecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0
	Perfluoroheptanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				0.0006	<0.005	0
	Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002 : 0.005 (Interlab)				0.0071	0.008	12
	Perfluorononanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0
	Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002 : 0.005 (Interlab)				<b>0.0052</b>	<b>0.009</b>	<b>54</b>
	Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002 : 0.01 (Interlab)				<0.0002	<0.01	0
	Perfluorotetradecanoic acid	mg/kg	0.0005 : 0.005 (Interlab)				<0.0005	<0.005	0
	Perfluorotridecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0
	Perfluoroundecanoic acid	mg/kg	0.0002 : 0.005 (Interlab)				<0.0002	<0.005	0

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL) )

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Filter: ALL



**Appendix G  
Table G2  
Sediment Duplicate Table**

Field Duplicates (Sediment)  
Filter: ALL

SDG Field ID	ALSE-Sydney 16-Dec-16 SS05	ALSE-Sydney 16-Dec-16 SSQA2	RPD
Sampled Date/Time	16/12/2016 21:25	16/12/2016 21:25	

Chem_Group	ChemName	Units	EQL			RPD	
TOC	Total Organic Carbon	%	0.5		0.7	0.6	15
Inorganics	Moisture	%	1		32.9	37.7	14
	pH (Lab)	pH Units	0.1		5.4	5.2	4
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	mg/kg	10		<10	<10	0
	C6 - C10 Fraction	mg/kg	10		<10	<10	0
	>C10-C16 minus Naphthalene (F2)	mg/kg	50		<50	<50	0
	>C10 - C16 Fraction	mg/kg	50		<50	<50	0
	>C16 - C34 Fraction (F3)	mg/kg	100		<100	<100	0
	>C34 - C40 Fraction (F4)	mg/kg	100		<100	<100	0
	>C10 - C40 (Sum of Total)	mg/kg	50		<50	<50	0
TRH - NEPM 1999	C6 - C 9 Fraction	mg/kg	10		<10	<10	0
	C10 - C14 Fraction	mg/kg	50		<50	<50	0
	C15 - C28 Fraction	mg/kg	100		<100	<100	0
	C29 - C36 Fraction	mg/kg	100		<100	<100	0
	C10 - C36 (Sum of Total)	mg/kg	50		<50	<50	0
BTEX & MAH	Benzene	mg/kg	0.2		<0.2	<0.2	0
	Toluene	mg/kg	0.5		<0.5	<0.5	0
	Ethylbenzene	mg/kg	0.5		<0.5	<0.5	0
	Xylene (o)	mg/kg	0.5		<0.5	<0.5	0
	Xylene (m & p)	mg/kg	0.5		<0.5	<0.5	0
	Xylene Total	mg/kg	0.5		<0.5	<0.5	0
	BTEX (Sum of Total) - Lab Calc	mg/kg	0.2		<0.2	<0.2	0
PAH	Polycyclic aromatic hydrocarbons	mg/kg	0.5		<0.5	<0.5	0
	Pyrene	mg/kg	0.5		<0.5	<0.5	0
	Acenaphthene	mg/kg	0.5		<0.5	<0.5	0
	Acenaphthylene	mg/kg	0.5		<0.5	<0.5	0
	Anthracene	mg/kg	0.5		<0.5	<0.5	0
	Benz(a)anthracene	mg/kg	0.5		<0.5	<0.5	0
	Benzo(a)pyrene	mg/kg	0.5		<0.5	<0.5	0
	Benzo(b+j)fluoranthene	mg/kg	0.5		<0.5	<0.5	0
	Benzo(k)fluoranthene	mg/kg	0.5		<0.5	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5		<0.5	<0.5	0
	Chrysene	mg/kg	0.5		<0.5	<0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.5		<0.5	<0.5	0
	Fluoranthene	mg/kg	0.5		<0.5	<0.5	0
	Fluorene	mg/kg	0.5		<0.5	<0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5		<0.5	<0.5	0
	Naphthalene	mg/kg	1		<1	<1	0
	Naphthalene	mg/kg	0.5		<0.5	<0.5	0
	Phenanthrene	mg/kg	0.5		<0.5	<0.5	0
	Benzo(a)pyrene TEQ (zero)	mg/kg	0.5		<0.5	<0.5	0
SVOCs	Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5		1.2	1.2	0
	Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5		0.6	0.6	0
PFAS	PFHxS and PFOS (Sum of Total) - Lab Calc	mg/kg	0.0002		<b>0.0757</b>	<b>0.197</b>	<b>89</b>
	4:2 Fluorotelomer sulfonic acid	mg/kg	0.0005		<0.0005	<0.0005	0
	10:2 Fluorotelomer sulfonic acid	mg/kg	0.0005		<0.0005	0.0006	18
	Perfluorobutane sulfonic acid	mg/kg	0.0002		0.0005	0.0008	46
	Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002		<b>0.0039</b>	<b>0.0108</b>	<b>94</b>
	Perfluoropentanoic acid	mg/kg	0.0002		0.0014	0.0019	30
	8:2 Fluorotelomer sulfonic acid	mg/kg	0.0005		<0.0005	<0.0005	0
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	mg/kg	0.0005		0.0007	0.0019	92
	Perfluorooctanoic acid (PFOA)	mg/kg	0.0002		<b>0.0024</b>	<b>0.0051</b>	<b>72</b>
	Perfluorobutanoic acid	mg/kg	0.001		<0.001	<0.001	0
	Perfluoroheptanoic acid	mg/kg	0.0002		0.0007	0.0012	53
	Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002		0.0031	0.0045	37
	Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002		<b>0.0718</b>	<b>0.186</b>	<b>89</b>
	PFAS (Sum of Total)(WA DER List)	mg/kg	0.0002		<b>0.0845</b>	<b>0.212</b>	<b>86</b>

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL) )

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories.

Any methods in the row header relate to those used in the primary laboratory





**Appendix G  
Table G3  
Water Duplicate Table**

Field Duplicates (water)  
Filter: SDG in('ALSE-Sydney 16-Dec-16','ALSE-Sydney 24-Jan-17','ALSE-

Chem Group	ChemName	Units	EQL	SDG	ALSE-Sydney 16-Dec-16	ALSE-Sydney 16-Dec-16	ALSE-Sydney 16-Dec-16	ALSE-Sydney 16-Dec-16	RPD	
				Field ID	SW05	SWQA1	GW01	GWQA3	RPD	
				Sampled Date/Time	16/12/2016 15:00	16/12/2016 15:00	16/12/2016	16/12/2016		
Inorganics	Sulfate as SO4 - Turbidimetric (Filtered)	mg/l	1		4	4	0	457	479	5
	pH (Lab)	pH Units	0.01		7.47	7.47	0	6.37	6.42	1
	Total Dissolved Solids (Filtered)	mg/l	10		151	137	10	8140	7780	5
Metals	Arsenic (Filtered)	mg/l	0.001		<0.001	<0.001	0	0.001	0.001	0
	Cadmium (Filtered)	mg/l	0.0001		<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Chromium (III+VI) (Filtered)	mg/l	0.001		<0.001	<0.001	0	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.001		<0.001	<0.001	0	0.001	0.002	67
	Lead (Filtered)	mg/l	0.001		<0.001	<0.001	0	<0.001	<0.001	0
	Mercury (Filtered)	mg/l	0.0001		<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.001		<0.001	<0.001	0	0.045	0.047	4
	Zinc (Filtered)	mg/l	0.005		<0.005	<0.005	0	0.11	0.119	8
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	µg/L	20		<20	<20	0	<20	<20	0
	C6 - C10 Fraction	µg/L	20		<20	<20	0	<20	<20	0
	>C10-C16 minus Naphthalene (F2)	µg/L	100		<100	<100	0	140	120	15
	>C10 - C16 Fraction	µg/L	100		<100	<100	0	140	120	15
	>C16 - C34 Fraction (F3)	µg/L	100		<100	<100	0	<100	<100	0
	>C34 - C40 Fraction (F4)	µg/L	100		<100	<100	0	<100	<100	0
	>C10 - C40 (Sum of Total)	µg/L	100		<100	<100	0	140	120	15
M 2013										
TRH - NEPM 1999	C6 - C 9 Fraction	µg/L	20		<20	<20	0	<20	<20	0
	C10 - C14 Fraction	µg/L	50		<50	<50	0	<50	<50	0
	C15 - C28 Fraction	µg/L	100		<100	<100	0	150	130	14
	C29 - C36 Fraction	µg/L	50		<50	<50	0	<50	<50	0
	C10 - C36 (Sum of Total)	µg/L	50		<50	<50	0	150	130	14
M 1999										
BTEX & MAH	Benzene	µg/L	1		<1	<1	0	<1	<1	0
	Toluene	µg/L	2		<2	<2	0	<2	<2	0
	Ethylbenzene	µg/L	2		<2	<2	0	<2	<2	0
	Xylene (o)	µg/L	2		<2	<2	0	<2	<2	0
	Xylene (m & p)	µg/L	2		<2	<2	0	<2	<2	0
	Xylene Total	µg/L	2		<2	<2	0	<2	<2	0
	BTEX (Sum of Total) - Lab Calc	µg/L	1		<1	<1	0	<1	<1	0
PAH	Polycyclic aromatic hydrocarbons	µg/L	0.5		<0.5	<0.5	0	<0.5	<0.5	0
	Pyrene	µg/L	1		<1	<1	0	<1	<1	0
	Acenaphthene	µg/L	1		<1	<1	0	<1	<1	0
	Acenaphthylene	µg/L	1		<1	<1	0	<1	<1	0
	Anthracene	µg/L	1		<1	<1	0	<1	<1	0
	Benz(a)anthracene	µg/L	1		<1	<1	0	<1	<1	0
	Benzo(a)pyrene	µg/L	0.5		<0.5	<0.5	0	<0.5	<0.5	0
	Benzo(b)fluoranthene	µg/L	1		<1	<1	0	<1	<1	0
	Benzo(k)fluoranthene	µg/L	1		<1	<1	0	<1	<1	0
	Benzo(g,h,i)perylene	µg/L	1		<1	<1	0	<1	<1	0
	Chrysene	µg/L	1		<1	<1	0	<1	<1	0
	Dibenz(a,h)anthracene	µg/L	1		<1	<1	0	<1	<1	0
	Fluoranthene	µg/L	1		<1	<1	0	<1	<1	0
	Fluorene	µg/L	1		<1	<1	0	<1	<1	0
	Indeno(1,2,3-c,d)pyrene	µg/L	1		<1	<1	0	<1	<1	0
	Naphthalene	µg/L	5		<5	<5	0	<5	<5	0
	Naphthalene	µg/L	1		<1	<1	0	<1	<1	0
	Phenanthrene	µg/L	1		<1	<1	0	<1	<1	0
	Benzo(a)pyrene TEQ (zero)	mg/l	0.0005		<0.0005	<0.0005	0	<0.0005	<0.0005	0
PFAS	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02							
	PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L	0.01		146	133	9	<0.01	<0.01	0
	4:2 Fluorotelomer sulfonic acid	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0
	10:2 Fluorotelomer sulfonic acid	µg/L	0.05		<0.05	<0.05	0	<0.05	<0.05	0
	N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02							
	N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02							
	Perfluorobutane sulfonic acid	µg/L	0.02		1.39	1.42	2	<0.02	<0.02	0
	Perfluoroheptane sulfonic acid	µg/L	0.02							
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02		9.41	9.11	3	<0.02	<0.02	0
	Perfluoropentanoic acid	µg/L	0.02		2.24	2.14	5	<0.02	<0.02	0
	8:2 Fluorotelomer sulfonic acid	µg/L	0.05		0.22	0.2	10	<0.05	<0.05	0
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.05							
	N-Ethyl perfluorooctane sulfonamidoethanol	µg/L	0.05							
	N-Methyl perfluorooctane sulfonamide	µg/L	0.05							
	N-Methyl perfluorooctane sulfonamidoethanol	µg/L	0.05							
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.05		0.77	0.88	13	<0.05	<0.05	0
	Perfluorooctanoic acid (PFOA)	µg/L	0.01		3.12	2.99	4	<0.01	<0.01	0
	Perfluoropentane sulfonic acid	µg/L	0.02							
	Perfluorobutanoic acid	µg/L	0.1		0.2	0.2	0	<0.1	<0.1	0
	Perfluorodecanoic acid	µg/L	0.02							
	Perfluorododecanoic acid	µg/L	0.02							
	Perfluoroheptanoic acid	µg/L	0.02		1.02	0.79	25	<0.02	<0.02	0
	Perfluorohexanoic acid (PFHxA)	µg/L	0.02		7.02	6.79	3	<0.02	<0.02	0
	Perfluorononanoic acid	µg/L	0.02							
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01		137	124	10	<0.01	<0.01	0
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.02							
	Perfluorotetradecanoic acid	µg/L	0.05							
	Perfluorotridecanoic acid	µg/L	0.02							
	Perfluoroundecanoic acid	µg/L	0.02							
	PFAS (Sum of Total)	µg/L	0.01							
	PFAS (Sum of Total)(WA DER List)	µg/L	0.01		162	148	9	<0.01	<0.01	0
Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/l	1		<1	<1	0	<1	<1	0
	Alkalinity (Hydroxide as CaCO3)	mg/l	1		<1	<1	0	<1	<1	0
	Alkalinity (total as CaCO3)	mg/l	1		60	72	18	124	121	2
	Bicarbonate Alkalinity as CaCO3	mg/l	1		60	72	18	124	121	2
Major Ions	Calcium (Filtered)	mg/l	1		14	16	13	108	112	4
	Chloride	mg/l	1		23	23	0	4260	4340	2
	Magnesium (Filtered)	mg/l	1		5	5	0	228	229	0
	Anions Total	meq/L	0.01		1.93	2.17	12	132	135	2
	Potassium (Filtered)	mg/l	1		4	4	0	11	11	0
	Sodium (Filtered)	mg/l	1		24	20	18	2470	2440	1
	Cations Total	meq/L	0.01		2.26	2.18	4	132	131	1
	Ionic Balance	%	0.01					0.11	1.49	173

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL) )

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory



**Appendix G  
Table G3  
Water Duplicate Table**

Field Duplicates (water)  
Filter: SDG in('ALSE-Sydney 16-Dec-16','ALSE-Sydney 24-Jan-17','ALSE-Sydney 24-Jan-17')

Chem Group	ChemName	Units	EQL	SDG	ALSE-Sydney 24-Jan-17	ALSE-Sydney 24-Jan-17	ALSE-Sydney 24-Jan-17	ALSE-Sydney 24-Jan-17	RPD
				Field ID	SW05	SWQA1	GW01	GWQA3	RPD
				Sampled Date/Time	16/12/2016	16/12/2016	16/12/2016	16/12/2016	
Inorganics	Sulfate as SO4 - Turbidimetric (Filtered)	mg/l	1						
	pH (Lab)	pH Units	0.01						
	Total Dissolved Solids (Filtered)	mg/l	10						
Metals	Arsenic (Filtered)	mg/l	0.001						
	Cadmium (Filtered)	mg/l	0.0001						
	Chromium (III+VI) (Filtered)	mg/l	0.001						
	Copper (Filtered)	mg/l	0.001						
	Lead (Filtered)	mg/l	0.001						
	Mercury (Filtered)	mg/l	0.0001						
	Nickel (Filtered)	mg/l	0.001						
	Zinc (Filtered)	mg/l	0.005						
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	µg/L	20						
	C6 - C10 Fraction	µg/L	20						
	>C10-C16 minus Naphthalene (F2)	µg/L	100						
	>C10 - C16 Fraction	µg/L	100						
	>C16 - C34 Fraction (F3)	µg/L	100						
	>C34 - C40 Fraction (F4)	µg/L	100						
	>C10 - C40 (Sum of Total)	µg/L	100						
M 2013									
TRH - NEPM 1999	C6 - C 9 Fraction	µg/L	20						
	C10 - C14 Fraction	µg/L	50						
	C15 - C28 Fraction	µg/L	100						
	C29 - C36 Fraction	µg/L	50						
	C10 - C36 (Sum of Total)	µg/L	50						
M 1999									
BTEX & MAH	Benzene	µg/L	1						
	Toluene	µg/L	2						
	Ethylbenzene	µg/L	2						
	Xylene (o)	µg/L	2						
	Xylene (m & p)	µg/L	2						
	Xylene Total	µg/L	2						
	BTEX (Sum of Total) - Lab Calc	µg/L	1						
PAH	Polycyclic aromatic hydrocarbons	µg/L	0.5						
	Pyrene	µg/L	1						
	Acenaphthene	µg/L	1						
	Acenaphthylene	µg/L	1						
	Anthracene	µg/L	1						
	Benz(a)anthracene	µg/L	1						
	Benzo(a)pyrene	µg/L	0.5						
	Benzo(b)fluoranthene	µg/L	1						
	Benzo(k)fluoranthene	µg/L	1						
	Benzo(g,h,i)perylene	µg/L	1						
	Chrysene	µg/L	1						
	Dibenz(a,h)anthracene	µg/L	1						
	Fluoranthene	µg/L	1						
	Fluorene	µg/L	1						
	Indeno(1,2,3-c,d)pyrene	µg/L	1						
	Naphthalene	µg/L	5						
	Naphthalene	µg/L	1						
	Phenanthrene	µg/L	1						
	Benzo(a)pyrene TEQ (zero)	mg/l	0.0005						
PFAS	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02	1.15	1.13	2	<0.1	<0.1	0
	PFHxS and PFOS (Sum of Total) - Lab Calc	µg/L	0.01	162	159	2	0.45	0.57	24
	4:2 Fluorotelomer sulfonic acid	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	10:2 Fluorotelomer sulfonic acid	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	N-Ethyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02	<0.02	<0.02	0	<0.1	<0.1	0
	N-Methyl perfluorooctane sulfonamidoacetic acid	µg/L	0.02	0.06	0.08	29	<0.1	<0.1	0
	Perfluorobutane sulfonic acid	µg/L	0.02	3.85	3.77	2	<0.1	<0.1	0
	Perfluorohexane sulfonic acid	µg/L	0.02	1.44	1.48	3	<0.1	<0.1	0
	Perfluorooxane sulfonic acid (PFHxS)	µg/L	0.02	27.2	26.2	4	<b>0.22</b>	<b>0.34</b>	<b>43</b>
	Perfluoropentanoic acid	µg/L	0.02	4.78	4.69	2	<0.1	<0.1	0
	8:2 Fluorotelomer sulfonic acid	µg/L	0.05	0.4	0.42	5	<0.25	<0.25	0
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	N-Ethyl perfluorooctane sulfonamidoethanol	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	N-Methyl perfluorooctane sulfonamide	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	N-Methyl perfluorooctane sulfonamidoethanol	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.05	3.64	3.33	9	<0.25	<0.25	0
	Perfluorooctanoic acid (PFOA)	µg/L	0.01	9.13	8.55	7	<0.05	<0.05	0
	Perfluoropentanoic acid	µg/L	0.02	3.5	3.46	1	<0.1	<0.1	0
	Perfluorobutanoic acid	µg/L	0.1	<0.1	<0.1	0	<0.5	<0.5	0
	Perfluorodecanoic acid	µg/L	0.02	0.08	0.08	0	<0.1	<0.1	0
	Perfluorododecanoic acid	µg/L	0.02	<0.02	<0.02	0	<0.1	<0.1	0
	Perfluorooxane sulfonic acid	µg/L	0.02	2.93	2.87	2	<0.1	<0.1	0
	Perfluorohexanoic acid (PFHxA)	µg/L	0.02	18.5	18.3	1	0.12	0.14	15
	Perfluorononanoic acid	µg/L	0.02	0.13	0.1	26	<0.1	<0.1	0
	Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	135	133	1	0.23	0.23	0
	Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	1.01	1.05	4	<0.1	<0.1	0
	Perfluorotetradecanoic acid	µg/L	0.05	<0.05	<0.05	0	<0.25	<0.25	0
	Perfluorotridecanoic acid	µg/L	0.02	<0.02	<0.02	0	<0.1	<0.1	0
	Perfluoroundecanoic acid	µg/L	0.02	<0.02	<0.02	0	<0.1	<0.1	0
	PFAS (Sum of Total)	µg/L	0.01	213	208	2	0.57	0.71	22
	PFAS (Sum of Total)(WA DER List)	µg/L	0.01	205	201	2	0.57	0.71	22
Alkalinity	Alkalinity (Carbonate as CaCO3)	mg/l	1						
	Alkalinity (Hydroxide as CaCO3)	mg/l	1						
	Alkalinity (total as CaCO3)	mg/l	1						
	Bicarbonate Alkalinity as CaCO3	mg/l	1						
Major Ions	Calcium (Filtered)	mg/l	1						
	Chloride	mg/l	1						
	Magnesium (Filtered)	mg/l	1						
	Anions Total	meq/L	0.01						
	Potassium (Filtered)	mg/l	1						
	Sodium (Filtered)	mg/l	1						
	Cations Total	meq/L	0.01						
	Ionic Balance	%	0.01						

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.  
 \*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 30 (10-30 x EQL)  
 \*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any meth



**Appendix G  
Table G4  
Soil and Water Blank Summary**

Field Blanks (soil)  
Filter: ALL

SDG Field ID Sampled_Date/Time Sample Type	ALSE-Sydney 16-Dec-16 Trip Blank 1 16/12/2016 Trip_B	ALSE-Sydney 16-Dec-16 Trip Blank 2 16/12/2016 Trip_B
---	---	---

Chem_Group	ChemName	Units	EQL		
BTEX & MAH	Benzene	mg/kg	0.1	<0.2	<0.2
	Toluene	mg/kg	0.1	<0.5	<0.5
	Ethylbenzene	mg/kg	0.1	<0.5	<0.5
	Xylene (o)	mg/kg	0.1	<0.5	<0.5
	Xylene (m & p)	mg/kg	0.2	<0.5	<0.5
	Xylene Total	mg/kg	0.3	<0.5	<0.5
	BTEX (Sum of Total) - Lab Calc	mg/kg	0.2	<0.2	<0.2
PAH	Naphthalene	mg/kg	0.5	<1	<1
TRH - NEPM 1999	C6 - C 9 Fraction	mg/kg	10	<10	<10
	C10 - C14 Fraction	mg/kg	20		
	C15 - C28 Fraction	mg/kg	50		
	C29 - C36 Fraction	mg/kg	50		
	C10 - C36 (Sum of Total)	mg/kg	50		
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	mg/kg	10	<10	<10
	C6 - C10 Fraction	mg/kg	10	<10	<10
	>C10-C16 minus Naphthalene (F2)	mg/kg	50		
	>C10 - C16 Fraction	mg/kg	50		
	>C16 - C34 Fraction (F3)	mg/kg	100		
	>C34 - C40 Fraction (F4)	mg/kg	100		
	>C10 - C40 (Sum of Total)	mg/kg	50		
Unassigned	TCLP Fluid	mg/kg	1		

Field Blanks (water)  
Filter: ALL

SDG Field ID Sampled_Date/Time Sample Type	ALSE-Sydney 09-Dec-16 RB_051216 5/12/2016 Rinsate	ALSE-Sydney 09-Dec-16 RB_061216 6/12/2016 Rinsate	ALSE-Sydney 09-Dec-16 RB_071216 7/12/2016 Rinsate	ALSE-Sydney 09-Dec-16 RB_081216 8/12/2016 Rinsate	ALSE-Sydney 16-Dec-16 Trip Blank 16/12/2016 Trip_B
---	--	--	--	--	---

Chem_Group	ChemName	Units	EQL					
BTEX & MAH	Benzene	µg/L	1	<1	<1	<1	<1	<1
	Toluene	µg/L	2	<2	<2	<2	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2
	Xylene (o)	µg/L	2	<2	<2	<2	<2	<2
	Xylene (m & p)	µg/L	2	<2	<2	<2	<2	<2
	Xylene Total	µg/L	2	<2	<2	<2	<2	<2
	BTEX (Sum of Total) - Lab Calc	µg/L	1	<1	<1	<1	<1	<1
PAH	Naphthalene	µg/L	1	<5	<5	<5	<5	<5
PFAS	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.02					
	PFHxS and PFOS (Sum of Total) - Lab	µg/L	0.01			<0.01		
	4:2 Fluorotelomer sulfonic acid	µg/L	0.05			<0.05		
	10:2 Fluorotelomer sulfonic acid	µg/L	0.05			<0.05		
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.02					
	N-Methyl perfluorooctane sulfonamide	µg/L	0.02					
	Perfluorobutane sulfonic acid	µg/L	0.02			<0.02		
	Perfluoroheptane sulfonic acid	µg/L	0.02					
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.02			<0.02		
	Perfluoropentanoic acid	µg/L	0.02			<0.02		
	8:2 Fluorotelomer sulfonic acid	µg/L	0.05			<0.05		
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.05					
	N-Ethyl perfluorooctane sulfonamide	µg/L	0.05					
	N-Methyl perfluorooctane sulfonamide	µg/L	0.05					
	N-Methyl perfluorooctane sulfonamide	µg/L	0.05					
	6:2 Fluorotelomer Sulfonate (6:2 FTS)	µg/L	0.05			<0.05		
	Perfluorooctanoic acid (PFOA)	µg/L	0.01			<0.01		
	Perfluoropentane sulfonic acid	µg/L	0.02					
	Perfluorobutanoic acid	µg/L	0.1			<0.1		
	Perfluorodecanoic acid	µg/L	0.02					
	Perfluorododecanoic acid	µg/L	0.02					
	Perfluoroheptanoic acid	µg/L	0.02			<0.02		
	Perfluorohexanoic acid (PFHxA)	µg/L	0.02			<0.02		
Perfluorononanoic acid	µg/L	0.02						
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01			<0.01			
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02						
Perfluorotetradecanoic acid	µg/L	0.05						
Perfluorotridecanoic acid	µg/L	0.02						
Perfluoroundecanoic acid	µg/L	0.02						
PFAS (Sum of Total)(WA DER List)	µg/L	0.01			<0.01			
TRH - NEPM 1999	C6 - C 9 Fraction	µg/L	20	<20	<20	<20	<20	<20
	C10 - C14 Fraction	µg/L	50					
	C15 - C28 Fraction	µg/L	100					
	C29 - C36 Fraction	µg/L	50					
	C10 - C36 (Sum of Total)	µg/L	50					
TRH - NEPM 2013	C6-C10 minus BTEX (F1)	µg/L	20	<20	<20	<20	<20	<20
	C6 - C10 Fraction	µg/L	20	<20	<20	<20	<20	<20
	>C10-C16 minus Naphthalene (F2)	µg/L	100					
	>C10 - C16 Fraction	µg/L	100					
	>C16 - C34 Fraction (F3)	µg/L	100					
	>C34 - C40 Fraction (F4)	µg/L	100					
	>C10 - C40 (Sum of Total)	µg/L	100					



## **Appendix H** – NATA accredited laboratory reports and chain of custody documentation



**CHAIN OF CUSTODY**

ALS Laboratory  
please tick →

ADELAIDE 21 Burma Road Pooraka SA 5098  
Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053  
Ph: 07 3243 7322 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Calamondah Drive Clinton QLD 4830  
Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740  
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MELBOURNE 2-4 Westall Road Springvale VIC 3171  
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 27 Sydney Road Mudgea NSW 2850  
Ph: 02 6372 6735 E: mudgea.mud@alsglobal.com

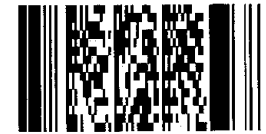
NEWCASTLE 5 Rose Gum Road Warbrook NSW 2304  
Ph: 02 4908 9433 E: samples.newcastle@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541  
Ph: 024423 2093 E: nowra@alsglobal.com

PERTH 10 Hop Way Malaga WA 6090  
Ph: 08 9209 7656 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164

**Environmental Division  
Sydney**  
Work Order Reference  
**ES1628401**



Telephone : + 61-2-8784 8555

CLIENT: GHD Pty Ltd	TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date): (Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):	FOR LAB USE
OFFICE: SYDNEY (CASTLEBROUGH ST)		
PROJECT: ALBION PARK	ALS QUOTE NO: EN/005/16	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER: 21-25583/02		
PROJECT MANAGER: BEN ANDERSON	CONTACT PH: 0408 713 343	
SAMPLER: Matthew West	SAMPLER MOBILE: 0408 650 579	RECEIVED BY: <i>Frank MS</i> DATE/TIME: <i>9-12-16 0830</i>
COC emailed to ALS? ( YES / NO)	EDD FORMAT (or default): ESDAT	
Email Reports to: Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com	RELINQUISHED BY: <b>MATTHEW WEST</b>	RELINQUISHED BY:
Email Invoice to (will default to PM if no other addresses are listed): Ben.Anderson@ghd.com and	DATE/TIME: 2:30PM 08/12/2016	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below (refer to)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
						PFAS (FULL SUITE)	TRH	BTEX	PAH's	TOC	CEC	PH	METAL (8)				
1	GW05_0.0_0.1	8-Dec	S	PLASTIC JAR	1												
2	GW05_0.5_0.6	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	2												
3	GW05_1.0_1.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	2												
4	GW05_1.6_1.7	8-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X							X	
5	GW05_2.8_2.9	8-Dec	S	PLASTIC JAR	1												
6	GW05_3.4_3.5	8-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X	X	X	X	
7	GW05_5.0_5.1	8-Dec	S	PLASTIC JAR	1												
8	GW05_5.9_6.0	8-Dec	S	PLASTIC JAR + GLASS JAR	2												
9	GW04_0.0_0.1	8-Dec	S	PLASTIC JAR + GLASS JAR	2												
10	GW04_0.5_0.6	8-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X	X	X	X	
11	GW04_1.0_1.1	8-Dec	S	PLASTIC JAR + GLASS JAR	2												
12	GW04_2.0_2.1	8-Dec	S	PLASTIC JAR	1												
TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



**CHAIN OF CUSTODY**

ALS Laboratory:  
please tick →

ADELAIDE 21 Burnt Road Pooraka SA 5065  
Ph: 08 8350 0800 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053  
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Castlemondah Drive Clinton QLD 4630  
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MACKAY 78 Harbour Road Mackay QLD 4740  
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MELBOURNE 2-4 Westall Road Springvale VIC 3171  
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NEWCASTLE 5 Rose Gum Road Warbrook NSW 2304  
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NOWRA 415 Geary Place North Nowra NSW 2541  
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PERTH 10 Hod Way Melaleuca WA 6090  
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SYDNEY 277-289 Woodpark Road Smithfield NSW 2164  
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TOWNSVILLE 14-16 Desma Court Bohle QLD 4618  
Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500  
Ph: 02 4225 3125 E: portkembla@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS :</b> <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATOR USE ONLY CUSTOMER USE ONLY Random Sampling Error: 10% Other comment:	
<b>OFFICE:</b> SYDNEY (CASTLEBREACH ST)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/16			
<b>ORDER NUMBER:</b> 21-25583/02		<b>COC SEQUENCE NUMBER (Circle)</b>			
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>CONTACT PH:</b> 0408 713 343		COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
<b>SAMPLER:</b> Matthew West		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>	
<b>COC emailed to ALS?</b> ( YES / NO)		<b>EDD FORMAT (or default):</b> ESDAT		<b>RECEIVED BY:</b> Frank ms	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com		<b>DATE/TIME:</b> 2:30PM		<b>DATE/TIME:</b> 9-12-16 0830	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and		08/12/2016		<b>RECEIVED BY:</b>	
<b>COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:</b>					

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i> (refer to)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information  Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.	
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)		
13	GW04_3.0_3.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1										
14	GW04_4.0_4.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1										
15	GW04_5.0_5.1	8-Dec	S	PLASTIC JAR	1										
16	GW04_6.0_6.1	8-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X				X		
17	GW03_0.0_0.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X				X		
18	GW03_0.5_0.6	7-Dec	S	PLASTIC JAR + GLASS JAR	2										
19	GW03_1.0_1.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2										
20	GW03_2.0_2.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2										
21	GW03_3.0_3.1	7-Dec	S	PLASTIC JAR	1										
22	GW03_4.0_4.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2										
23	GW03_5.0_5.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X		
24	GW03_6.1_6.2	7-Dec	S	PLASTIC JAR + GLASS JAR	2										
<b>TOTAL</b>															

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.





# CHAIN OF CUSTODY

ALS Laboratory:  
please tick →

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Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

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MACKAY 76 Harbour Road Mackay QLD 4749  
Ph: 07 4944 0177 E: mackay@alsglobal.com

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NEWCASTLE 5 Rose Gum Road Warbrook NSW 2304  
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NOWRA 413 Geary Place North Nowra NSW 2541  
Ph: 024423 2063 E: nowra@alsglobal.com

PERTH 10 Ford Way Malaga WA 6000  
Ph: 08 9209 7955 E: samples.perth@alsglobal.com

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Ph: 02 8784 9555 E: samples.sydney@alsglobal.com

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Ph: 07 4756 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500  
Ph: 02 4225 3125 E: portknox@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS :</b>		<input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle) Custody Seal Marked For Sample Integrity For Sample Integrity Other Comments	
<b>OFFICE:</b> SYDNEY (CASTLEREACH SY)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):		<b>COC SEQUENCE NUMBER (Circle)</b> COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/16					
<b>ORDER NUMBER:</b> 21-25583/02							
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>CONTACT PH:</b> 0408 713 343					
<b>SAMPLER:</b> Matthew West		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>		<b>RECEIVED BY:</b>	
<b>COC emailed to ALS?</b> ( YES / NO)		<b>EDD FORMAT (or default):</b> ESDAT		<b>MATTHEW WEST</b>		Frank ALS	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew.West@ghd.com and Melissa.Weber@ghd.com				<b>DATE/TIME:</b> 2:30PM		<b>DATE/TIME:</b>	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and				08/12/2016		9-12-16 0830	
<b>COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:</b>							

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)			
25	GW02_0.0_0.2	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	2											
26	GW02_0.5_0.6	6-Dec	S	GLASS JAR + TEFLON LID REMOVED	2	X	X	X	X	X	X	X				
27	GW02_1.0_1.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2											
28	GW02_2.0_2.1	6-Dec	S	PLASTIC JAR	1											
29	GW02_3.0_3.1	6-Dec	S	PLASTIC JAR	1											
30	GW02_4.0_4.1	6-Dec	S	PLASTIC JAR	1											
31	GW02_5.0_5.1	6-Dec	S	PLASTIC JAR	1	X										
32	GW02_6.0_6.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X							
33	GW01_0.0_0.2	6-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X					X		
34	GW01_0.5_0.6	6-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X					X		
35	GW01_1.0_1.1	6-Dec	S	PLASTIC JAR	1											
36	GW01_2.0_2.1	6-Dec	S	PLASTIC JAR	1											
<b>TOTAL</b>																

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solis; B = Unpreserved Bag.



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<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS:</b> <input checked="" type="checkbox"/> Standard TAT (List due date):		<b>FOR LABORATORY USE ONLY (Circle)</b> <input type="checkbox"/> Non Standard or urgent TAT (List due date):	
<b>OFFICE:</b> SYDNEY (CASTLEBROUGH ST)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/16		<b>COC SEQUENCE NUMBER (Circle)</b>	
<b>ORDER NUMBER:</b> 21-25583/02		<b>CONTACT PH:</b> 0408 713 343		COC: 1 2 3 4 5 6 7	
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>SAMPLER MOBILE:</b> 0408 650 579		OF: 1 2 3 4 5 6 7	
<b>SAMPLER:</b> Matthew West		<b>RELINQUISHED BY:</b> MATTHEW WEST		<b>RECEIVED BY:</b> Frank Mc	
<b>COC emailed to ALS? ( YES / NO )</b>		<b>EDD FORMAT (or default):</b> ESDAT		<b>DATE/TIME:</b> 2:30PM	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com		<b>DATE/TIME:</b> 08/12/2016		<b>DATE/TIME:</b> 9-12-16 0830	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and		<b>RECEIVED BY:</b>		<b>RECEIVED BY:</b>	
<b>COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:</b>		<b>RECEIVED BY:</b>		<b>RECEIVED BY:</b>	

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
						PFAS (FULL SUITE)	TRH	BTEX	PAH's	TOC	CEC	PH	METAL (8)				
37	GW01_3.0_3.1	6-Dec	S	PLASTIC JAR	1												
38	GW01_4.0_4.1	6-Dec	S	PLASTIC JAR	1	X											
39	GW01_5.0_5.1	6-Dec	S	PLASTIC JAR	1												
40	SB06_0.0_0.15	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
41	SB06_0.5_0.6	6-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X						X		
42	SB06_1.0_1.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
43	SB06_2.0_2.1	6-Dec	S	PLASTIC JAR	1		X	X	X	X	X	X	X	X	X		
44	SB06_3.0_3.1	6-Dec	S	PLASTIC JAR	1												
45	SB06_4.0_4.1	6-Dec	S	PLASTIC JAR	1												
46	SB06_5.0_5.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2	X											
47	SB06_5.9_6.0	6-Dec	S	PLASTIC JAR	1												
48	SB07_ASHPALT_0.0_0.3	5-Dec	M	MATERIAL SAMPLE	NA	X											
<b>TOTAL</b>																	

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 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



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Ph: 02 4225 3125 E: portkembla@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS:</b> <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (GFD) Sample ID: No Sample Name: No Sample Location: No Sample Date: No Sample Temperature: No Other Comments: No	
<b>OFFICE:</b> SYDNEY (CASTLE REACH ST)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/18		<b>COC SEQUENCE NUMBER (Circle)</b>	
<b>ORDER NUMBER:</b> 21-25583/02				COC: 1 2 3 4 5 6 7	
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>CONTACT PH:</b> 0408 713 343		OF: 1 2 3 4 5 6 7	
<b>SAMPLER:</b> Matthew West		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>	
<b>COC emailed to ALS? ( YES / NO)</b>		<b>EDD FORMAT (or default):</b> ESDAT		<b>RECEIVED BY:</b>	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com		<b>DATE/TIME:</b> 2:30PM		<b>DATE/TIME:</b>	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and		<b>DATE/TIME:</b> 08/12/2016		<b>DATE/TIME:</b>	
<b>COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:</b>					

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information	
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)		
49	SB07_0.05_0.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
50	SB07_0.5_0.6	5-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X					X	
51	SB07_1.0_1.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
52	SB07_2.0_2.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
53	SB07_3.0_3.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X		
54	SB07_3.9_4.0	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
55	SB07_5.0_5.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
56	SB07_5.9_6.0	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
57	SB08_0.0_0.15	5-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X					X	
58	SB08_0.5_0.6	5-Dec	S	PLASTIC JAR + GLASS JAR	2	X									
59	SB08_1.0_1.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2										
60	SB08_2.0_2.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X	X	X	X	X		
<b>TOTAL</b>															

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.





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Ph: 02 4225 3125 E: port Kembla@alsglobal.com

CLIENT: GHD Pty Ltd	<b>TURNAROUND REQUIREMENTS :</b> <input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (Circle) ( )
OFFICE: SYDNEY (CASTLEREAGH ST)	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):		
PROJECT: ALBION PARK	ALS QUOTE NO: EN/005/16	COC SEQUENCE NUMBER (Circle)	
ORDER NUMBER: 21-25583/02		COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	
PROJECT MANAGER: BEN ANDERSON	CONTACT PH: 0408 713 343	RELINQUISHED BY: MATTHEW WEST	RECEIVED BY: Frank MS
SAMPLER: Matthew West	SAMPLER MOBILE: 0408 650 579	DATE/TIME: 2:30PM	DATE/TIME: 9-12-16 0830
COC emailed to ALS? ( YES / NO)	EDD FORMAT (or default): ESDAT	08/12/2016	
Email Reports to: Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): Ben.Anderson@ghd.com and			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.		
61	SB08_3.0_3.1	5-Dec	S	PLASTIC JAR	1											
62	SB08_4.0_4.1	5-Dec	S	PLASTIC JAR	1											
63	SB08_5.0_5.1	5-Dec	S	PLASTIC JAR	1	X										
64	SB08_5.9_6.0	5-Dec	S	PLASTIC JAR	1											
65	SB09_0.0_0.1	5-Dec	S	PLASTIC JAR + GLASS JAR	2	X										
66	SB09_0.5_0.6	5-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X	X	X	X	X	X		
67	SB09_1.0_1.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2											
68	SB09_2.0_2.1	6-Dec	S	PLASTIC JAR	1											
69	SB09_3.0_3.1	6-Dec	S	PLASTIC JAR	1											
70	SB09_4.0_4.1	6-Dec	S	PLASTIC JAR	1	X	X	X	X					X		
71	SB09_5.0_5.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2											
72	SB09_5.8_5.9	6-Dec	S	PLASTIC JAR + GLASS JAR	2											
<b>TOTAL</b>																

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 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



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Ph: 02 4225 3125 E: portkembla@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS:</b> <input checked="" type="checkbox"/> Standard TAT (List due date): (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		<input type="checkbox"/> Non Standard or urgent TAT (List due date):	
<b>OFFICE:</b> SYDNEY (CASTLE BREACH ST)		<b>ALS QUOTE NO:</b> EN/005/16		<b>COC SEQUENCE NUMBER (Circle)</b>	
<b>PROJECT:</b> ALBION PARK				COC: 1 2 3 4 5 6 7	
<b>ORDER NUMBER:</b> 21-25583/02				OF: 1 2 3 4 5 6 7	
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>CONTACT PH:</b> 0408 713 343			
<b>SAMPLER:</b> Matthew West		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>	
<b>COC emailed to ALS?</b> ( YES / NO)		<b>EDD FORMAT (or default):</b> ESDAT		<b>MATTHEW WEST</b>	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com		<b>DATE/TIME:</b> 2:30PM		<b>RECEIVED BY:</b> Frank MS	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and		<b>DATE/TIME:</b> 08/12/2016		<b>RECEIVED BY:</b>	
<b>COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:</b>				<b>RECEIVED BY:</b>	

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)				
73	SB10_0.0_0.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X								
74	SB10_0.5_0.6	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
75	SB10_1.0_1.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
76	SB10_2.0_2.1	6-Dec	S	PLASTIC JAR	1												
77	SB10_2.3_2.5	6-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X				
78	SB10_3.0_3.1	6-Dec	S	PLASTIC JAR	1												
79	SB10_4.0_4.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
80	SB10_5.1-5.2	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
81	SB11_0.0_0.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2												
82	SB11_0.5_0.6	7-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X							X	
83	SB11_1.0_1.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X	X	X	X	
84	SB11_3.0_3.1	7-Dec	S	PLASTIC JAR	1												
					<b>TOTAL</b>												

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



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MACKAY 73 Harbour Road Mackay QLD 4740  
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MELBOURNE 2-4 Westall Road Springvale VIC 3171  
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MUDGEE 27 Sydney Road Mudgee NSW 2850  
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NEWCASTLE 5 Rose Gum Road Warimbok NSW 2304  
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NOOWARA 4713 Geary Place North Nowra NSW 2541  
Ph: 024423 2063 E: noowara@alsglobal.com

PERTH 15 Hobd Way Yalga WA 6090  
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SYDNEY 277-289 Woodpark Road Smithfield NSW 2164  
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Beale QLD 4818  
Ph: 07 4798 9800 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500  
Ph: 02 4225 3125 E: portkembia@alsglobal.com

CLIENT: GHD Pty Ltd		TURNAROUND REQUIREMENTS : <input checked="" type="checkbox"/> Standard TAT (List due date): (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		<table border="1"> <tr> <th colspan="7">COC SEQUENCE NUMBER (Circle)</th> </tr> <tr> <td>COC: 1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> <tr> <td>OF: 1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> </table>		COC SEQUENCE NUMBER (Circle)							COC: 1	2	3	4	5	6	7	OF: 1	2	3	4	5	6	7
COC SEQUENCE NUMBER (Circle)																										
COC: 1	2	3	4	5	6	7																				
OF: 1	2	3	4	5	6	7																				
OFFICE: SYDNEY (CASTLEREACH ST)		<input type="checkbox"/> Non Standard or urgent TAT (List due date): <b>ALS QUOTE NO: EN/005/16</b>																								
PROJECT: ALBION PARK		CONTACT PH: 0408 713 343																								
ORDER NUMBER: 21-25583/02		PROJECT MANAGER: BEN ANDERSON		SAMPLER: Matthew West		SAMPLER MOBILE: 0408 650 579																				
COC emailed to ALS? ( YES / NO)		EDD FORMAT (or default): ESDAT		RELINQUISHED BY: MATTHEW WEST		RECEIVED BY: <i>Frank ms</i>																				
Email Reports to: Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com		Email Invoice to (will default to PM if no other addresses are listed): Ben.Anderson@ghd.com and		DATE/TIME: 2:30PM		DATE/TIME: 9-12-16 0830																				
				08/12/2016																						

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below (refer to)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)				
85	SB11_5.4-5.5	6-Dec	S	PLASTIC JAR	1	X											
86	SB12_0.0_0.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X							X	
87	SB12_0.5_0.6	7-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X	X	X	X	X				
88	SB12_1.0_1.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2												
89	SB12_2.0_2.1	7-Dec	S	PLASTIC JAR	1												
90	SB12_4.0_4.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2												
91	SB12_5.6_5.7	7-Dec	S	PLASTIC JAR	1	X											
92	SB13_0.0_0.1	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
93	SB13_0.5_0.6	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X							X	
94	SB13_1.0_1.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2												
95	SB13_2.0_2.1	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X	X	X	X	X	X	X		
96	SB13_2.3_2.4	7-Dec	S	PLASTIC JAR + GLASS JAR	2												
<b>TOTAL</b>																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.





# CHAIN OF CUSTODY

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please tick →

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Ph: 02 4225 0125 E: portkimbria@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS:</b>		<input checked="" type="checkbox"/> Standard TAT (List due date):		FOR LABORATORY USE ONLY (S/N) Custody (S/N) Random Sample Temperature Receipt Other Comments	
<b>OFFICE:</b> SYDNEY (ASB FLOREADH ST)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)		<input type="checkbox"/> Non Standard or urgent TAT (List due date):			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/16		<b>COC SEQUENCE NUMBER (Circle)</b>			
<b>ORDER NUMBER:</b> 21-25583/02				COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7			
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>CONTACT PH:</b> 0408 713 343					
<b>SAMPLER:</b> Matthew West		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>		<b>RECEIVED BY:</b>	
<b>COC emailed to ALS?</b> ( YES / NO)		<b>EDD FORMAT (or default):</b> ESDAT		<b>MATTHEW WEST</b>		<b>FRANK AS</b>	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew.West@ghd.com and Melissa.Weber@ghd.com				<b>DATE/TIME:</b> 2:30PM		<b>DATE/TIME:</b> 9-12-16 0830	
<b>Email Invoice to (will default to PM if no other addresses are listed):</b> Ben.Anderson@ghd.com and				<b>DATE/TIME:</b> 08/12/2016		<b>DATE/TIME:</b>	

**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:**

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information
						PFAS	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)			
97	SB13_3.9-4.0	6-Dec	S	PLASTIC JAR	1											
98	SB14_0.0_0.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1											
99	SB14_0.5_0.6	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1	X	X	X	X	X	X	X	X	X		
100	SB14_1.0_1.1	8-Dec	S	PLASTIC JAR	1											
101	SB14_2.0_2.1	8-Dec	S	PLASTIC JAR	1		X	X	X						X	
102	SB14_3.0_3.1	8-Dec	S	PLASTIC JAR	1	X										
103	SB14_5.0_5.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1											
104	SB14_5.9_6.0	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1											
105	SB15_0.0_0.1	8-Dec	S	PLASTIC JAR + GLASS JAR	2											
106	SB15_0.5_0.6	8-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X	X	X	X	X	X		
107	SB15_1.0_1.1	8-Dec	S	PLASTIC JAR + GLASS JAR	2	X										
108	SB15_2.0_2.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	2		X	X	X						X	
<b>TOTAL</b>																

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
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please tick →

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NOYRA 413 Geary Place North Nowra NSW 2541  
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Ph: 02 4225 3125 E: portkembler@alsglobal.com

<b>CLIENT:</b> GHD Pty Ltd		<b>TURNAROUND REQUIREMENTS:</b> <input checked="" type="checkbox"/> Standard TAT (List due date):		<b>COC SEQUENCE NUMBER (Circle)</b>	
<b>OFFICE:</b> SYDNEY (CASTLEBROUGH ST)		(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) <input type="checkbox"/> Non Standard or urgent TAT (List due date):			
<b>PROJECT:</b> ALBION PARK		<b>ALS QUOTE NO:</b> EN/005/16		<b>COC:</b> 1 2 3 4 5 6 7	
<b>ORDER NUMBER:</b> 21-25583/02		<b>CONTACT PH:</b> 0408 713 343		<b>OP:</b> 1 2 3 4 5 6 7	
<b>PROJECT MANAGER:</b> BEN ANDERSON		<b>SAMPLER MOBILE:</b> 0408 650 579		<b>RELINQUISHED BY:</b>	
<b>SAMPLER:</b> Matthew West		<b>EDD FORMAT (or default):</b> ESDAT		<b>RECEIVED BY:</b> Frank me	
<b>COC emailed to ALS? (YES / NO)</b>		<b>RELINQUISHED BY:</b> MATTHEW WEST		<b>DATE/TIME:</b> 2:30PM	
<b>Email Reports to:</b> Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa Weber@ghd.com		<b>DATE/TIME:</b> 08/12/2016		<b>DATE/TIME:</b> 9-12-16 0830	
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LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE <i>codes below</i>	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).										Additional Information	
						PFAS (LIMITED SUITE)	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)				
109	SB15_3.0_3.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1												
110	SB15_4.0_4.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1												
111	SB15_5.0_5.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1	X											
112	SB15_5.5_5.6	8-Dec	S	GLASS JAR + TEFLON LID REMOVED	1												
113	BD1_051216	5-Dec	S	PLASTIC JAR + GLASS JAR	2		X	X	X						X		
114	BD2_061216	6-Dec	S	PLASTIC JAR + GLASS JAR	2												
115	BD3_071216	7-Dec	S	PLASTIC JAR + GLASS JAR	2	X	X	X	X						X	PLEASE FORWARD TO EUROFIN'S AS BLIND DUP	
116	BD4_081216	8-Dec	S	PLASTIC JAR + GLASS JAR	2												
116	RB_051216	8-Dec	W	2 VIAL, 1 METALS BOTTLE	3	X	X	X									
117	RB_061216	8-Dec	W	2 VIAL, 1 METALS BOTTLE	3		X	X									
118	RB_071216	8-Dec	W	2 VIAL, 1 METALS BOTTLE, 1 500mL	4	X	X	X									
119	RB_081216	8-Dec	W	2 VIAL, 1 METALS BOTTLE, 1 500mL	4		X	X									
<b>TOTAL</b>																	

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic  
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 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.



## CERTIFICATE OF ANALYSIS

<b>Work Order</b> : <b>ES1628401</b> <b>Client</b> : <b>GHD PTY LTD</b> <b>Contact</b> : <b>MR BEN ANDERSON</b> <b>Address</b> : <b>LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000</b>  <b>Telephone</b> : <b>+61 08 6222 8222</b> <b>Project</b> : <b>ALBION PARK</b> <b>Order number</b> : <b>21-25583/02</b> <b>C-O-C number</b> : <b>----</b> <b>Sampler</b> : <b>Matthew West</b> <b>Site</b> : <b>----</b> <b>Quote number</b> : <b>EN/005/15</b> <b>No. of samples received</b> : <b>123</b> <b>No. of samples analysed</b> : <b>49</b>	<b>Page</b> : 1 of 52 <b>Laboratory</b> : Environmental Division Sydney <b>Contact</b> : Customer Services ES <b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164  <b>Telephone</b> : +61-2-8784 8555 <b>Date Samples Received</b> : 09-Dec-2016 08:30 <b>Date Analysis Commenced</b> : 12-Dec-2016 <b>Issue Date</b> : 19-Dec-2016 17:57
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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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao		Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Lana Nguyen	Senior LCMS Chemist	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW





## General Comments

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

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

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

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

When 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.

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

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

- EP071: Results of sample SB07\_0.5-0.6 have been confirmed by re-extraction and re-analysis
- The trip spike and its control have been analysed for volatile TPH and BTEX only. EP080: The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- 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.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).



## Analytical Results

Sub-Matrix: ASPHALT (Matrix: SOIL)		Client sample ID		SB07_ASHPALT_0.0_0.3	----	----	----	----
Client sampling date / time				05-Dec-2016 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1628401-048	-----	-----	-----	-----
				Result	----	----	----	----
<b>EA055: Moisture Content</b>								
Moisture Content (dried @ 103°C)	----	1	%	1.1	----	----	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0144	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----



## Analytical Results

Sub-Matrix: ASPHALT (Matrix: SOIL)				Client sample ID	SB07_ASHPALT_0.0_0.3	----	----	----	----
Client sampling date / time				05-Dec-2016 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1628401-048	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----	----
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	0.0151	----	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0146	----	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0148	----	----	----	----	----
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	115	----	----	----	----	----



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05_1.6_1.7	GW05_3.4_3.5	GW04_0.5_0.6	GW04_6.0_6.1	GW03_0.0_0.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-004	ES1628401-006	ES1628401-010	ES1628401-016	ES1628401-017	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	5.0	4.7	----	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	22.0	19.1	16.2	22.6	9.9	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	1.3	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	7.0	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	0.2	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	6.8	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	15.2	----	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	<0.1	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	<0.1	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	<0.1	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	<0.1	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	<0.1	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
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	19	20	22	14	16	
Copper	7440-50-8	5	mg/kg	54	29	12	42	16	
Lead	7439-92-1	5	mg/kg	79	11	11	18	18	
Nickel	7440-02-0	2	mg/kg	11	4	4	5	4	
Zinc	7440-66-6	5	mg/kg	278	27	8	30	26	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	<0.5	0.7	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05_1.6_1.7	GW05_3.4_3.5	GW04_0.5_0.6	GW04_6.0_6.1	GW03_0.0_0.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-004	ES1628401-006	ES1628401-010	ES1628401-016	ES1628401-017	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50	
<b>EP080: BTEXN</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05_1.6_1.7	GW05_3.4_3.5	GW04_0.5_0.6	GW04_6.0_6.1	GW03_0.0_0.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-004	ES1628401-006	ES1628401-010	ES1628401-016	ES1628401-017	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0005	<0.0002	<0.0002	<0.0002	0.0147	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	<0.0002	<0.0002	<0.0002	0.0099	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0021	<0.0002	0.0012	<0.0002	0.140	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0185	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0015	<0.0002	0.0007	<0.0002	0.676	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0081	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	<0.0002	<0.0002	<0.0002	0.0323	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0105	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	<0.0002	<0.0002	<0.0002	0.0243	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05_1.6_1.7	GW05_3.4_3.5	GW04_0.5_0.6	GW04_6.0_6.1	GW03_0.0_0.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-004	ES1628401-006	ES1628401-010	ES1628401-016	ES1628401-017	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<b>0.0005</b>	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<b>0.0053</b>	<0.0002	<b>0.0019</b>	<0.0002	<b>0.937</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.0036</b>	<0.0002	<b>0.0019</b>	<0.0002	<b>0.816</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.0050</b>	<0.0002	<b>0.0019</b>	<0.0002	<b>0.907</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>75.2</b>	<b>73.8</b>	<b>83.2</b>	<b>73.4</b>	<b>77.3</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>82.9</b>	<b>83.6</b>	<b>81.9</b>	<b>83.7</b>	<b>87.9</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>85.7</b>	<b>78.1</b>	<b>76.1</b>	<b>71.6</b>	<b>89.3</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW05_1.6_1.7	GW05_3.4_3.5	GW04_0.5_0.6	GW04_6.0_6.1	GW03_0.0_0.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-004	ES1628401-006	ES1628401-010	ES1628401-016	ES1628401-017	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	90.6	94.0	93.3	94.9	96.7	
Anthracene-d10	1719-06-8	0.5	%	100	107	101	107	107	
4-Terphenyl-d14	1718-51-0	0.5	%	82.2	86.2	84.0	86.3	90.9	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	94.8	125	123	123	106	
Toluene-D8	2037-26-5	0.2	%	108	119	118	114	116	
4-Bromofluorobenzene	460-00-4	0.2	%	102	117	120	120	99.0	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	111	85.5	83.5	82.8	103	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW03_5.0_5.1	GW02_0.5_0.6	GW02_5.0_5.1	GW02_6.0_6.1	GW01_0.0_0.2
Client sampling date / time				07-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-023	ES1628401-026	ES1628401-031	ES1628401-032	ES1628401-033	ES1628401-033
				Result	Result	Result	Result	Result	Result
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	4.7	4.5	----	----	----	----
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	17.6	22.8	23.1	18.0	9.3	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	0.8	0.4	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	3.6	9.1	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.3	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	2.5	10.6	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	6.9	20.4	----	----	----	----
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	----
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----	<5
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----	<1
Chromium	7440-47-3	2	mg/kg	16	----	----	----	----	15
Copper	7440-50-8	5	mg/kg	16	----	----	----	----	16
Lead	7439-92-1	5	mg/kg	9	----	----	----	----	16
Nickel	7440-02-0	2	mg/kg	4	----	----	----	----	3
Zinc	7440-66-6	5	mg/kg	18	----	----	----	----	20
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----	<0.1
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	<0.5	0.8	----	----	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW03_5.0_5.1	GW02_0.5_0.6	GW02_5.0_5.1	GW02_6.0_6.1	GW01_0.0_0.2
Client sampling date / time				07-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-023	ES1628401-026	ES1628401-031	ES1628401-032	ES1628401-033	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
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	
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	<b>0.6</b>	<b>0.6</b>	----	<b>0.6</b>	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	<b>1.2</b>	----	<b>1.2</b>	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	
<b>EP080: BTEXN</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW03_5.0_5.1	GW02_0.5_0.6	GW02_5.0_5.1	GW02_6.0_6.1	GW01_0.0_0.2
Client sampling date / time				07-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-023	ES1628401-026	ES1628401-031	ES1628401-032	ES1628401-033	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0002	0.0024	<0.0002	----	0.0015	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.0014	<0.0002	----	0.0010	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	0.0340	0.0008	----	0.0154	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.0007	<0.0002	----	0.0015	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.0263	0.0012	----	0.0193	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.0006	<0.0002	----	0.0030	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	0.0028	<0.0002	----	0.0042	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.0002	<0.0002	----	0.0014	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0004	<0.0002	----	0.0018	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW03_5.0_5.1	GW02_0.5_0.6	GW02_5.0_5.1	GW02_6.0_6.1	GW01_0.0_0.2
Client sampling date / time				07-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-023	ES1628401-026	ES1628401-031	ES1628401-032	ES1628401-033	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<b>0.0010</b>	<b>0.0688</b>	<b>0.0020</b>	----	<b>0.0491</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.0005</b>	<b>0.0603</b>	<b>0.0020</b>	----	<b>0.0347</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.0010</b>	<b>0.0667</b>	<b>0.0020</b>	----	<b>0.0466</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>81.6</b>	<b>80.5</b>	----	<b>78.0</b>	<b>79.3</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>72.4</b>	<b>72.0</b>	----	<b>73.6</b>	<b>84.6</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>76.2</b>	<b>83.1</b>	----	<b>73.0</b>	<b>101</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									





**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW03_5.0_5.1	GW02_0.5_0.6	GW02_5.0_5.1	GW02_6.0_6.1	GW01_0.0_0.2
Client sampling date / time				07-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-023	ES1628401-026	ES1628401-031	ES1628401-032	ES1628401-033	ES1628401-033
				Result	Result	Result	Result	Result	Result
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	106	91.0	----	87.7	108	108
Anthracene-d10	1719-06-8	0.5	%	102	97.6	----	113	113	113
4-Terphenyl-d14	1718-51-0	0.5	%	96.7	82.5	----	84.0	90.1	90.1
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	111	105	----	118	113	113
Toluene-D8	2037-26-5	0.2	%	119	115	----	112	120	120
4-Bromofluorobenzene	460-00-4	0.2	%	124	114	----	104	123	123
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	72.1	89.7	78.8	----	98.4	98.4



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.5_0.6	GW01_4.0_4.1	SB06_0.5_0.6	SB06_2.0_2.1	SB06_5.0_5.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-034	ES1628401-038	ES1628401-041	ES1628401-043	ES1628401-046	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	----	----	5.1	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	25.3	21.1	18.9	20.7	18.1	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	0.2	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	5.3	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	0.1	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	1.2	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	15.1	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	<5	----	<5	<5	----	
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	<1	----	
Chromium	7440-47-3	2	mg/kg	39	----	22	26	----	
Copper	7440-50-8	5	mg/kg	18	----	26	33	----	
Lead	7439-92-1	5	mg/kg	16	----	15	15	----	
Nickel	7440-02-0	2	mg/kg	6	----	6	3	----	
Zinc	7440-66-6	5	mg/kg	9	----	17	19	----	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	<0.1	----	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	----	----	0.8	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.5_0.6	GW01_4.0_4.1	SB06_0.5_0.6	SB06_2.0_2.1	SB06_5.0_5.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-034	ES1628401-038	ES1628401-041	ES1628401-043	ES1628401-046	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	<b>0.6</b>	----	<b>0.6</b>	<b>0.6</b>	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	----	<b>1.2</b>	<b>1.2</b>	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	<10	----	
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	<50	----	
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	<100	----	
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	<100	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	<50	<50	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	<10	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	<10	<10	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	----	<50	<50	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	<100	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	<100	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	<50	<50	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	<50	<50	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	<0.2	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.5_0.6	GW01_4.0_4.1	SB06_0.5_0.6	SB06_2.0_2.1	SB06_5.0_5.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-034	ES1628401-038	ES1628401-041	ES1628401-043	ES1628401-046	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	<0.2	<0.2	----	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	----	
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	<1	----	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	<0.0002	<b>0.0055</b>	----	<b>0.0153</b>	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	<0.0002	<b>0.0070</b>	----	<b>0.0102</b>	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	<0.0002	<b>0.164</b>	----	<b>0.0733</b>	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	<0.0002	<b>0.0506</b>	----	<b>0.0032</b>	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	<0.0002	<b>3.57</b>	----	<b>0.0226</b>	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	<0.0002	<b>0.0036</b>	----	<0.0002	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	<0.001	<0.001	----	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	<0.0002	<b>0.0036</b>	----	<b>0.0038</b>	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	<0.0002	<b>0.0163</b>	----	<b>0.0193</b>	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	<0.0002	<b>0.0086</b>	----	<b>0.0043</b>	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	<0.0002	<b>0.0599</b>	----	<b>0.0054</b>	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	<0.0005	<0.0012	----	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.5_0.6	GW01_4.0_4.1	SB06_0.5_0.6	SB06_2.0_2.1	SB06_5.0_5.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-034	ES1628401-038	ES1628401-041	ES1628401-043	ES1628401-046	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	<0.0002	<b>0.0018</b>	----	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	<0.0005	<0.0012	----	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	<0.0005	<0.0012	----	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	----	<0.0005	<0.0012	----	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	<0.0005	<0.0012	----	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	<0.0002	<0.0005	----	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	<0.0005	<0.0005	----	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	<0.0005	<0.0005	----	<b>0.0043</b>	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	<0.0005	<0.0005	----	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	<0.0005	<0.0005	----	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	----	<0.0002	<b>3.89</b>	----	<b>0.162</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	<0.0002	<b>3.73</b>	----	<b>0.0959</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	<0.0002	<b>3.83</b>	----	<b>0.148</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>75.7</b>	----	<b>77.8</b>	<b>87.9</b>	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>83.3</b>	----	<b>85.6</b>	<b>79.7</b>	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>87.7</b>	----	<b>101</b>	<b>77.0</b>	----	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.5_0.6	GW01_4.0_4.1	SB06_0.5_0.6	SB06_2.0_2.1	SB06_5.0_5.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-034	ES1628401-038	ES1628401-041	ES1628401-043	ES1628401-046	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	89.5	----	96.9	86.2	----	
Anthracene-d10	1719-06-8	0.5	%	100	----	107	102	----	
4-Terphenyl-d14	1718-51-0	0.5	%	97.8	----	84.2	93.4	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	115	----	123	115	----	
Toluene-D8	2037-26-5	0.2	%	113	----	120	109	----	
4-Bromofluorobenzene	460-00-4	0.2	%	112	----	120	110	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	----	80.0	106	----	74.3	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB07_0.5_0.6	SB07_3.0_3.1	SB08_0.0_0.15	SB08_0.5_0.6	SB08_2.0_2.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-050	ES1628401-053	ES1628401-057	ES1628401-058	ES1628401-060	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	5.6	----	----	5.2	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	8.4	20.0	9.7	15.0	21.1	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	<0.1	----	----	0.2	
Exchangeable Magnesium	----	0.1	meq/100g	----	10.7	----	----	7.2	
Exchangeable Potassium	----	0.1	meq/100g	----	0.2	----	----	0.2	
Exchangeable Sodium	----	0.1	meq/100g	----	5.0	----	----	4.3	
Cation Exchange Capacity	----	0.1	meq/100g	----	16.5	----	----	11.9	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
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	<2	12	17	----	20	
Copper	7440-50-8	5	mg/kg	143	14	30	----	29	
Lead	7439-92-1	5	mg/kg	<5	13	12	----	14	
Nickel	7440-02-0	2	mg/kg	5	3	7	----	3	
Zinc	7440-66-6	5	mg/kg	37	12	17	----	13	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	0.3	<0.1	----	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	<0.5	----	----	<0.5	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB07_0.5_0.6	SB07_3.0_3.1	SB08_0.0_0.15	SB08_0.5_0.6	SB08_2.0_2.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-050	ES1628401-053	ES1628401-057	ES1628401-058	ES1628401-060	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
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	
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	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	----	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	----	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
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	<b>260</b>	<100	<100	----	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<b>260</b>	<50	<50	----	<50	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	<b>160</b>	<100	<100	----	<100	
>C34 - C40 Fraction	----	100	mg/kg	<b>360</b>	<100	<100	----	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<b>520</b>	<50	<50	----	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	<50	
<b>EP080: BTEXN</b>									
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	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB07_0.5_0.6	SB07_3.0_3.1	SB08_0.0_0.15	SB08_0.5_0.6	SB08_2.0_2.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-050	ES1628401-053	ES1628401-057	ES1628401-058	ES1628401-060	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	0.0005	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	0.0013	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0005	----	0.0137	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	0.0046	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0035	0.0032	----	0.124	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	<0.001	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	0.0010	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.0003	----	0.0040	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	0.0005	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	0.0019	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB07_0.5_0.6	SB07_3.0_3.1	SB08_0.0_0.15	SB08_0.5_0.6	SB08_2.0_2.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-050	ES1628401-053	ES1628401-057	ES1628401-058	ES1628401-060	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<b>0.0015</b>	<0.0005	----	<0.0005	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<b>0.0050</b>	<b>0.0040</b>	----	<b>0.152</b>	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.0035</b>	<b>0.0037</b>	----	<b>0.138</b>	----	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.0050</b>	<b>0.0040</b>	----	<b>0.146</b>	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>85.6</b>	<b>92.6</b>	<b>91.0</b>	----	<b>87.2</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>87.5</b>	<b>83.5</b>	<b>90.6</b>	----	<b>90.4</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>87.0</b>	<b>78.9</b>	<b>82.4</b>	----	<b>87.8</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB07_0.5_0.6	SB07_3.0_3.1	SB08_0.0_0.15	SB08_0.5_0.6	SB08_2.0_2.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-050	ES1628401-053	ES1628401-057	ES1628401-058	ES1628401-060	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	97.2	90.7	91.5	----	91.4	
Anthracene-d10	1719-06-8	0.5	%	105	95.5	107	----	96.6	
4-Terphenyl-d14	1718-51-0	0.5	%	87.5	84.8	85.2	----	80.4	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	109	121	124	----	119	
Toluene-D8	2037-26-5	0.2	%	107	112	119	----	109	
4-Bromofluorobenzene	460-00-4	0.2	%	89.7	106	124	----	110	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	98.5	94.7	----	97.7	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB08_5.0_5.1	SB09_0.0_0.1	SB09_0.5_0.6	SB09_4.0_4.1	SB10_0.0_0.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-063	ES1628401-065	ES1628401-066	ES1628401-070	ES1628401-073	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	----	5.0	----	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	17.8	19.9	29.0	20.8	11.0	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	<0.1	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	11.2	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	0.2	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	8.9	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	20.4	----	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	----	----	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg	----	----	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	----	----	15	16	11	
Copper	7440-50-8	5	mg/kg	----	----	12	13	6	
Lead	7439-92-1	5	mg/kg	----	----	10	12	11	
Nickel	7440-02-0	2	mg/kg	----	----	4	2	2	
Zinc	7440-66-6	5	mg/kg	----	----	6	10	<5	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	----	----	<0.1	<0.1	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	----	2.1	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB08_5.0_5.1	SB09_0.0_0.1	SB09_0.5_0.6	SB09_4.0_4.1	SB10_0.0_0.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-063	ES1628401-065	ES1628401-066	ES1628401-070	ES1628401-073	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Fluoranthene	206-44-0	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Benzo(a)anthracene	56-55-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	----	----	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	----	----	<50	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	----	----	<100	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	----	----	<100	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	<50	<50	<50	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	<10	<10	<10	
>C10 - C16 Fraction	----	50	mg/kg	----	----	<50	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	----	----	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	----	----	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	<50	<50	<50	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	----	----	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB08_5.0_5.1	SB09_0.0_0.1	SB09_0.5_0.6	SB09_4.0_4.1	SB10_0.0_0.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-063	ES1628401-065	ES1628401-066	ES1628401-070	ES1628401-073	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	----	----	<0.2	<0.2	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	----	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	----	----	<1	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0020	0.0172	----	0.0056	0.0004	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0027	0.0431	----	0.0091	0.0027	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0103	0.143	----	0.0444	0.0496	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0003	0.104	----	0.0033	0.0079	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	4.07	----	0.0459	0.0967	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0218	----	<0.0002	<0.0002	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.012	----	<0.001	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0012	0.0231	----	0.0044	0.0075	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0063	0.127	----	0.0299	0.0169	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0005	0.0136	----	0.0028	0.0039	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0008	0.0671	----	0.0049	0.0097	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.0015	----	<0.0002	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.0004	----	<0.0002	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	<0.0002	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB08_5.0_5.1	SB09_0.0_0.1	SB09_0.5_0.6	SB09_4.0_4.1	SB10_0.0_0.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-063	ES1628401-065	ES1628401-066	ES1628401-070	ES1628401-073	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<b>0.0068</b>	----	<0.0002	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<b>0.0005</b>	----	<0.0002	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<b>0.0004</b>	----	<0.0002	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	<0.0005	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<b>0.0175</b>	----	<b>0.0013</b>	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<b>0.0028</b>	----	<0.0005	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<b>0.0008</b>	----	<0.0005	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<b>0.0241</b>	<b>4.67</b>	----	<b>0.152</b>	<b>0.196</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.0103</b>	<b>4.21</b>	----	<b>0.0903</b>	<b>0.146</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.0211</b>	<b>4.49</b>	----	<b>0.139</b>	<b>0.185</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	----	----	<b>86.2</b>	<b>87.4</b>	<b>87.9</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	<b>82.9</b>	<b>78.9</b>	<b>84.4</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	----	----	<b>93.7</b>	<b>83.5</b>	<b>86.5</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB08_5.0_5.1	SB09_0.0_0.1	SB09_0.5_0.6	SB09_4.0_4.1	SB10_0.0_0.1
Client sampling date / time				05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	06-Dec-2016 00:00	06-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-063	ES1628401-065	ES1628401-066	ES1628401-070	ES1628401-073	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	91.3	91.3	93.7	
Anthracene-d10	1719-06-8	0.5	%	----	----	102	96.8	103	
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	81.9	81.1	82.2	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	121	124	124	
Toluene-D8	2037-26-5	0.2	%	----	----	104	107	116	
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	106	104	110	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	116	93.9	----	105	93.3	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_2.3_2.5	SB11_0.5_0.6	SB11_1.0_1.1	SB11_5.4-5.5	SB12_0.0_0.1
Client sampling date / time				06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-077	ES1628401-082	ES1628401-083	ES1628401-085	ES1628401-086	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	5.4	----	5.0	----	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	10.7	12.8	13.5	14.8	12.6	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	4.1	----	<0.1	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	8.8	----	2.1	----	----	
Exchangeable Potassium	----	0.1	meq/100g	0.5	----	<0.1	----	----	
Exchangeable Sodium	----	0.1	meq/100g	1.2	----	1.0	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	14.5	----	3.1	----	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	6	<5	<5	----	<5	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	<1	
Chromium	7440-47-3	2	mg/kg	15	21	28	----	24	
Copper	7440-50-8	5	mg/kg	15	6	9	----	12	
Lead	7439-92-1	5	mg/kg	8	10	19	----	13	
Nickel	7440-02-0	2	mg/kg	2	4	4	----	6	
Zinc	7440-66-6	5	mg/kg	10	<5	23	----	9	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	<0.5	----	<0.5	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_2.3_2.5	SB11_0.5_0.6	SB11_1.0_1.1	SB11_5.4-5.5	SB12_0.0_0.1
Client sampling date / time				06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-077	ES1628401-082	ES1628401-083	ES1628401-085	ES1628401-086	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
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	
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	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	----	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	----	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	
<b>EP080: BTEXN</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_2.3_2.5	SB11_0.5_0.6	SB11_1.0_1.1	SB11_5.4-5.5	SB12_0.0_0.1
Client sampling date / time				06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-077	ES1628401-082	ES1628401-083	ES1628401-085	ES1628401-086	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0032</b>	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0036</b>	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<b>0.0006</b>	----	<0.0002	<0.0002	<b>0.0111</b>	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0005</b>	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<b>0.0007</b>	----	<0.0002	<0.0002	<b>0.0052</b>	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	<0.001	<0.001	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0021</b>	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<b>0.0002</b>	----	<0.0002	<0.0002	<b>0.0071</b>	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0006</b>	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<b>0.0004</b>	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_2.3_2.5	SB11_0.5_0.6	SB11_1.0_1.1	SB11_5.4-5.5	SB12_0.0_0.1
Client sampling date / time				06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-077	ES1628401-082	ES1628401-083	ES1628401-085	ES1628401-086	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	<0.0002	<0.0002	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	<0.0005	<0.0005	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<b>0.0015</b>	----	<0.0002	<0.0002	<b>0.0338</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.0013</b>	----	<0.0002	<0.0002	<b>0.0163</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.0015</b>	----	<0.0002	<0.0002	<b>0.0297</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>89.5</b>	<b>73.2</b>	<b>84.0</b>	----	<b>98.7</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>81.6</b>	<b>100</b>	<b>103</b>	----	<b>103</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>79.4</b>	<b>112</b>	<b>124</b>	----	<b>124</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									





### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB10_2.3_2.5	SB11_0.5_0.6	SB11_1.0_1.1	SB11_5.4-5.5	SB12_0.0_0.1
Client sampling date / time				06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-077	ES1628401-082	ES1628401-083	ES1628401-085	ES1628401-086	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	91.7	113	110	----	114	
Anthracene-d10	1719-06-8	0.5	%	102	120	117	----	118	
4-Terphenyl-d14	1718-51-0	0.5	%	84.2	100	87.4	----	104	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	122	129	112	----	110	
Toluene-D8	2037-26-5	0.2	%	116	117	95.4	----	91.7	
4-Bromofluorobenzene	460-00-4	0.2	%	113	110	90.1	----	88.7	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	91.9	----	96.3	116	82.3	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB12_0.5_0.6	SB12_5.6_5.7	SB13_0.5_0.6	SB13_2.0_2.1	SB14_0.5_0.6
Client sampling date / time				07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-087	ES1628401-091	ES1628401-093	ES1628401-095	ES1628401-099	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	4.5	----	----	5.4	4.9	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	15.0	14.7	11.0	10.4	14.0	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	<0.1	----	----	<0.1	<0.1	
Exchangeable Magnesium	----	0.1	meq/100g	5.0	----	----	4.8	4.6	
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	<0.1	<0.1	
Exchangeable Sodium	----	0.1	meq/100g	1.0	----	----	2.5	1.1	
Cation Exchange Capacity	----	0.1	meq/100g	6.2	----	----	7.5	5.8	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	9	----	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	35	----	13	7	27	
Copper	7440-50-8	5	mg/kg	11	----	10	7	15	
Lead	7439-92-1	5	mg/kg	20	----	10	<5	19	
Nickel	7440-02-0	2	mg/kg	4	----	2	<2	9	
Zinc	7440-66-6	5	mg/kg	5	----	7	<5	9	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	<0.1	<0.1	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	0.8	----	----	<0.5	2.7	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB12_0.5_0.6	SB12_5.6_5.7	SB13_0.5_0.6	SB13_2.0_2.1	SB14_0.5_0.6
Client sampling date / time				07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-087	ES1628401-091	ES1628401-093	ES1628401-095	ES1628401-099	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
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	
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	<b>0.6</b>	----	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	----	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	
<b>EP080: BTEXN</b>									
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	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB12_0.5_0.6	SB12_5.6_5.7	SB13_0.5_0.6	SB13_2.0_2.1	SB14_0.5_0.6
Client sampling date / time				07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-087	ES1628401-091	ES1628401-093	ES1628401-095	ES1628401-099	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<b>0.0005</b>	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<b>0.0016</b>	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	<0.0002	<b>0.0002</b>	<0.0002	<b>0.0103</b>	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	<0.0002	<b>0.0066</b>	<0.0002	<b>0.0020</b>	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	<0.001	<0.001	<0.001	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<b>0.0003</b>	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB12_0.5_0.6	SB12_5.6_5.7	SB13_0.5_0.6	SB13_2.0_2.1	SB14_0.5_0.6
Client sampling date / time				07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-087	ES1628401-091	ES1628401-093	ES1628401-095	ES1628401-099	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	<0.0002	<0.0002	<0.0002	<0.0002	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	<0.0005	<0.0005	<0.0005	<0.0005	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	----	<0.0002	<b>0.0068</b>	<0.0002	<b>0.0147</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	<0.0002	<b>0.0068</b>	<0.0002	<b>0.0123</b>	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	<0.0002	<b>0.0068</b>	<0.0002	<b>0.0131</b>	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>91.3</b>	----	<b>90.6</b>	<b>89.6</b>	<b>97.8</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>102</b>	----	<b>103</b>	<b>105</b>	<b>109</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>120</b>	----	<b>124</b>	<b>118</b>	<b>119</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB12_0.5_0.6	SB12_5.6_5.7	SB13_0.5_0.6	SB13_2.0_2.1	SB14_0.5_0.6
Client sampling date / time				07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-087	ES1628401-091	ES1628401-093	ES1628401-095	ES1628401-099	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	108	----	113	112	119	
Anthracene-d10	1719-06-8	0.5	%	125	----	125	119	120	
4-Terphenyl-d14	1718-51-0	0.5	%	108	----	110	106	113	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	121	----	128	128	128	
Toluene-D8	2037-26-5	0.2	%	109	----	114	111	116	
4-Bromofluorobenzene	460-00-4	0.2	%	99.7	----	102	105	104	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	----	84.5	102	99.1	105	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB14_2.0_2.1	SB14_3.0_3.1	SB15_0.5_0.6	SB15_1.0_1.1	SB15_2.0_2.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1628401-101	ES1628401-102	ES1628401-106	ES1628401-107	ES1628401-108	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	----	5.0	----	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	22.9	21.9	14.7	23.8	24.5	
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	0.5	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	2.3	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	0.1	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	1.1	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	4.3	----	----	
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	<5	----	<5	----	<5	
Cadmium	7440-43-9	1	mg/kg	<1	----	<1	----	<1	
Chromium	7440-47-3	2	mg/kg	20	----	28	----	16	
Copper	7440-50-8	5	mg/kg	35	----	13	----	33	
Lead	7439-92-1	5	mg/kg	11	----	18	----	13	
Nickel	7440-02-0	2	mg/kg	5	----	12	----	3	
Zinc	7440-66-6	5	mg/kg	18	----	7	----	11	
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	0.1	----	<0.1	----	<0.1	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	----	1.2	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB14_2.0_2.1	SB14_3.0_3.1	SB15_0.5_0.6	SB15_1.0_1.1	SB15_2.0_2.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-101	ES1628401-102	ES1628401-106	ES1628401-107	ES1628401-108	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	<b>0.6</b>	----	<b>0.6</b>	----	<b>0.6</b>	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	<b>1.2</b>	----	<b>1.2</b>	----	<b>1.2</b>	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	----	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	----	<50	
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	----	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	----	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	<50	----	<50	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	----	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	<10	----	<10	
>C10 - C16 Fraction	----	50	mg/kg	<50	----	<50	----	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	----	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	----	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	<50	----	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	<50	----	<50	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB14_2.0_2.1	SB14_3.0_3.1	SB15_0.5_0.6	SB15_1.0_1.1	SB15_2.0_2.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-101	ES1628401-102	ES1628401-106	ES1628401-107	ES1628401-108	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	----	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	<0.0002	----	0.0006	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	<0.0002	----	0.0116	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	<0.0002	----	0.0006	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	<0.0002	----	0.0174	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	<0.001	----	<0.001	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	<0.0002	----	0.0006	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	<0.0002	----	0.0047	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	<0.0002	----	0.0004	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	<0.0002	----	0.0010	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	<0.0002	----	0.0008	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB14_2.0_2.1	SB14_3.0_3.1	SB15_0.5_0.6	SB15_1.0_1.1	SB15_2.0_2.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-101	ES1628401-102	ES1628401-106	ES1628401-107	ES1628401-108	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	<0.0002	----	<0.0002	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	<0.0005	----	<0.0005	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	----	<0.0002	----	<b>0.0377</b>	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	<0.0002	----	<b>0.0290</b>	----	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	<0.0002	----	<b>0.0357</b>	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>99.8</b>	----	<b>89.9</b>	----	<b>93.3</b>	
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>112</b>	----	<b>101</b>	----	<b>104</b>	
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>116</b>	----	<b>116</b>	----	<b>110</b>	
<b>EP075(SIM)T: PAH Surrogates</b>									



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB14_2.0_2.1	SB14_3.0_3.1	SB15_0.5_0.6	SB15_1.0_1.1	SB15_2.0_2.1
Client sampling date / time				08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1628401-101	ES1628401-102	ES1628401-106	ES1628401-107	ES1628401-108	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	125	----	114	----	116	
Anthracene-d10	1719-06-8	0.5	%	127	----	122	----	120	
4-Terphenyl-d14	1718-51-0	0.5	%	114	----	102	----	106	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	126	----	126	----	92.2	
Toluene-D8	2037-26-5	0.2	%	110	----	112	----	74.0	
4-Bromofluorobenzene	460-00-4	0.2	%	103	----	102	----	72.0	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	----	104	----	110	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB15_5.0_5.1	BD1_051216	TRIP SPIKE 7	TSC	----
Client sampling date / time				08-Dec-2016 00:00	05-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-111	ES1628401-113	ES1628401-120	ES1628401-121	-----	-----
				Result	Result	Result	Result	----	----
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	----	----	----	----	----
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	16.7	9.0	----	----	----	----
<b>ED007: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	----
<b>ED008: Exchangeable Cations</b>									
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	----	----	----
<b>EG005T: Total Metals by ICP-AES</b>									
Arsenic	7440-38-2	5	mg/kg	----	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	----	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	----	9	----	----	----	----
Copper	7440-50-8	5	mg/kg	----	64	----	----	----	----
Lead	7439-92-1	5	mg/kg	----	10	----	----	----	----
Nickel	7440-02-0	2	mg/kg	----	5	----	----	----	----
Zinc	7440-66-6	5	mg/kg	----	28	----	----	----	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>									
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	----	----	----	----
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	----	----	----	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
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	----	----	----	----





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB15_5.0_5.1	BD1_051216	TRIP SPIKE 7	TSC	----
Client sampling date / time				08-Dec-2016 00:00	05-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-111	ES1628401-113	ES1628401-120	ES1628401-121	-----	-----
				Result	Result	Result	Result	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	<b>0.6</b>	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	<b>1.2</b>	----	----	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	----	<10	<b>12</b>	<b>20</b>	----	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	----	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	<b>14</b>	<b>22</b>	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	----	----
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	----	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	<b>3.5</b>	<b>6.3</b>	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	<0.5	<b>0.8</b>	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	<b>3.1</b>	<b>5.0</b>	----	----



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB15_5.0_5.1	BD1_051216	TRIP SPIKE 7	TSC	----
Client sampling date / time				08-Dec-2016 00:00	05-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-111	ES1628401-113	ES1628401-120	ES1628401-121	-----	-----
				Result	Result	Result	Result	----	----
<b>EP080: BTEXN - Continued</b>									
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	1.2	2.0	----	----
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	7.8	14.1	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	----	<0.5	4.3	7.0	----	----
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	<1	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB15_5.0_5.1	BD1_051216	TRIP SPIKE 7	TSC	----
Client sampling date / time				08-Dec-2016 00:00	05-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-111	ES1628401-113	ES1628401-120	ES1628401-121	-----	-----
				Result	Result	Result	Result	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----	----
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----	----
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	----	91.9	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	----	102	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%	----	115	----	----	----	----
<b>EP075(SIM)T: PAH Surrogates</b>									



**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB15_5.0_5.1	BD1_051216	TRIP SPIKE 7	TSC	----
Client sampling date / time				08-Dec-2016 00:00	05-Dec-2016 00:00	28-Nov-2016 00:00	28-Nov-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-111	ES1628401-113	ES1628401-120	ES1628401-121	-----	-----
				Result	Result	Result	Result	----	----
<b>EP075(SIM)T: PAH Surrogates - Continued</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	----	112	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	----	126	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	----	103	----	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	125	117	121	----	----
Toluene-D8	2037-26-5	0.2	%	----	107	105	107	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	----	97.3	91.5	92.2	----	----
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	104	----	----	----	----	----





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB_051216	RB_061216	RB_071216	RB_081216	----
Client sampling date / time				05-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-116	ES1628401-117	ES1628401-118	ES1628401-119	-----	-----
				Result	Result	Result	Result	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	----	----
<b>EP080: BTEXN</b>									
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	1330-20-7	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	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	----	----	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	----	----	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	----	----	<0.01	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	----	----	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	----	----	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	----	----	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	----	----	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	----	----	<0.01	----	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	----	----	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	----	----	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	----	----	<0.05	----	----	----



### Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	RB_051216	RB_061216	RB_071216	RB_081216	----
Client sampling date / time				05-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1628401-116	ES1628401-117	ES1628401-118	ES1628401-119	-----	-----
				Result	Result	Result	Result	----	----
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	----	----	<0.05	----	----	----
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	----	----	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	----	----	<0.01	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	108	113	109	120	----	----
Toluene-D8	2037-26-5	2	%	91.8	96.0	90.8	103	----	----
4-Bromofluorobenzene	460-00-4	2	%	93.7	94.9	90.0	98.1	----	----
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	----	----	88.6	----	----	----



## Surrogate Control Limits

Sub-Matrix: ASPHALT		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	70	130

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	70	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1628401	Page	: 1 of 22
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: ALBION PARK	Date Samples Received	: 09-Dec-2016
Site	: ----	Issue Date	: 19-Dec-2016
Sampler	: Matthew West	No. of samples received	: 123
Order number	: 21-25583/02	No. of samples analysed	: 49

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





### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Laboratory Control Spike (LCS) Recoveries</b>							
EP004: Organic Matter	QC-689655-002	----	<b>Total Organic Carbon</b>	----	100 %	81-99%	<b>Recovery greater than upper control limit</b>

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EB1629099--001	Anonymous	<b>6:2 Fluorotelomer sulfonic acid (6:2 FTS)</b>	27619-97-2	Not Determined	----	<b>MS recovery not determined, background level greater than or equal to 4x spike level.</b>

### Regular Sample Surrogates

Sub-Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Samples Submitted</b>							
EP075(SIM)T: PAH Surrogates	ES1628401-101	SB14_2.0_2.1	<b>2-Fluorobiphenyl</b>	321-60-8	125 %	70-122 %	<b>Recovery greater than upper data quality objective</b>

### Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EP004: Organic Matter</b>						
<b>HDPE Soil Jar</b> SB06_2.0_2.1	14-Dec-2016	13-Dec-2016	<b>1</b>	----	----	----

### Outliers : Frequency of Quality Control Samples

Matrix: **SOIL**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
<b>Laboratory Control Samples (LCS)</b>					
Exchangeable Cations with pre-treatment	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

### Analysis Holding Time Compliance

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

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

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

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



Matrix: **SOIL**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EA002 : pH (Soils)</b>							
<b>HDPE Soil Jar (EA002)</b> SB06_2.0_2.1	06-Dec-2016	13-Dec-2016	13-Dec-2016	✓	13-Dec-2016	13-Dec-2016	✓
<b>HDPE Soil Jar (EA002)</b> GW05_3.4_3.5	08-Dec-2016	14-Dec-2016	15-Dec-2016	✓	14-Dec-2016	14-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA002)</b> SB07_3.0_3.1, SB09_0.5_0.6	SB08_2.0_2.1, 05-Dec-2016	12-Dec-2016	12-Dec-2016	✓	12-Dec-2016	12-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA002)</b> GW02_0.5_0.6,	SB10_2.3_2.5 06-Dec-2016	13-Dec-2016	13-Dec-2016	✓	13-Dec-2016	13-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA002)</b> GW03_5.0_5.1, SB12_0.5_0.6,	SB11_1.0_1.1, SB13_2.0_2.1 07-Dec-2016	14-Dec-2016	14-Dec-2016	✓	14-Dec-2016	14-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA002)</b> GW04_0.5_0.6, SB15_0.5_0.6	SB14_0.5_0.6, 08-Dec-2016	14-Dec-2016	15-Dec-2016	✓	14-Dec-2016	14-Dec-2016	✓



Matrix: SOIL

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EA055: Moisture Content</b>							
<b>HDPE Soil Jar (EA055-103)</b> SB08_5.0_5.1	05-Dec-2016	----	----	----	13-Dec-2016	19-Dec-2016	✓
<b>HDPE Soil Jar (EA055-103)</b> GW02_5.0_5.1, SB06_2.0_2.1, SB11_5.4-5.5	GW01_4.0_4.1, SB09_4.0_4.1, 06-Dec-2016	----	----	----	13-Dec-2016	20-Dec-2016	✓
<b>HDPE Soil Jar (EA055-103)</b> SB12_5.6_5.7	07-Dec-2016	----	----	----	13-Dec-2016	21-Dec-2016	✓
<b>HDPE Soil Jar (EA055-103)</b> GW05_3.4_3.5, SB14_3.0_3.1	SB14_2.0_2.1, 08-Dec-2016	----	----	----	13-Dec-2016	22-Dec-2016	✓
<b>Snap Lock Bag (EA055-103)</b> SB07_ASHPALT_0.0_0.3	05-Dec-2016	----	----	----	13-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA055-103)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB08_2.0_2.1, SB09_0.5_0.6,	SB07_3.0_3.1, SB08_0.5_0.6, SB09_0.0_0.1, BD1_051216, 05-Dec-2016	----	----	----	13-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA055-103)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_0.0_0.1,	GW02_6.0_6.1, GW01_0.5_0.6, SB06_5.0_5.1, SB10_2.3_2.5, 06-Dec-2016	----	----	----	13-Dec-2016	20-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA055-103)</b> GW03_0.0_0.1, SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	GW03_5.0_5.1, SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1, 07-Dec-2016	----	----	----	13-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EA055-103)</b> GW05_1.6_1.7, GW04_6.0_6.1, SB15_0.5_0.6, SB15_2.0_2.1,	GW04_0.5_0.6, SB14_0.5_0.6, SB15_1.0_1.1, SB15_5.0_5.1, 08-Dec-2016	----	----	----	13-Dec-2016	22-Dec-2016	✓



Matrix: SOIL

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>ED007: Exchangeable Cations</b>							
<b>HDPE Soil Jar (ED007)</b> SB06_2.0_2.1	06-Dec-2016	19-Dec-2016	03-Jan-2017	✓	19-Dec-2016	03-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (ED007)</b> SB07_3.0_3.1, SB09_0.5_0.6	SB08_2.0_2.1, 05-Dec-2016	19-Dec-2016	02-Jan-2017	✓	19-Dec-2016	02-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (ED007)</b> GW02_0.5_0.6,	SB10_2.3_2.5 06-Dec-2016	19-Dec-2016	03-Jan-2017	✓	19-Dec-2016	03-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (ED007)</b> GW03_5.0_5.1, SB12_0.5_0.6,	SB11_1.0_1.1, SB13_2.0_2.1 07-Dec-2016	19-Dec-2016	04-Jan-2017	✓	19-Dec-2016	04-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (ED007)</b> GW04_0.5_0.6, SB15_0.5_0.6	SB14_0.5_0.6, 08-Dec-2016	19-Dec-2016	05-Jan-2017	✓	19-Dec-2016	05-Jan-2017	✓
<b>ED008: Exchangeable Cations</b>							
<b>HDPE Soil Jar (ED008)</b> GW05_3.4_3.5	08-Dec-2016	15-Dec-2016	05-Jan-2017	✓	15-Dec-2016	05-Jan-2017	✓
<b>EG005T: Total Metals by ICP-AES</b>							
<b>HDPE Soil Jar (EG005T)</b> SB06_2.0_2.1,	SB09_4.0_4.1 06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	04-Jun-2017	✓
<b>HDPE Soil Jar (EG005T)</b> GW05_3.4_3.5,	SB14_2.0_2.1 08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	06-Jun-2017	✓
<b>Soil Glass Jar - Unpreserved (EG005T)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6,	SB07_3.0_3.1, SB08_2.0_2.1, BD1_051216 05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	03-Jun-2017	✓
<b>Soil Glass Jar - Unpreserved (EG005T)</b> GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW01_0.5_0.6, SB10_0.0_0.1, 06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	04-Jun-2017	✓
<b>Soil Glass Jar - Unpreserved (EG005T)</b> GW03_0.0_0.1, SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	GW03_5.0_5.1, SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1 07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	05-Jun-2017	✓
<b>Soil Glass Jar - Unpreserved (EG005T)</b> GW05_1.6_1.7, GW04_6.0_6.1, SB15_0.5_0.6,	GW04_0.5_0.6, SB14_0.5_0.6, SB15_2.0_2.1 08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	06-Jun-2017	✓





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	
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
<b>HDPE Soil Jar (EG035T)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	15-Dec-2016	03-Jan-2017	✔	16-Dec-2016	03-Jan-2017	✔
<b>HDPE Soil Jar (EG035T)</b> GW05_3.4_3.5,	SB14_2.0_2.1	08-Dec-2016	15-Dec-2016	05-Jan-2017	✔	16-Dec-2016	05-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EG035T)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6,	SB07_3.0_3.1, SB08_2.0_2.1, BD1_051216	05-Dec-2016	15-Dec-2016	02-Jan-2017	✔	16-Dec-2016	02-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EG035T)</b> GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	15-Dec-2016	03-Jan-2017	✔	16-Dec-2016	03-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EG035T)</b> GW03_0.0_0.1, SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	GW03_5.0_5.1, SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	15-Dec-2016	04-Jan-2017	✔	16-Dec-2016	04-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EG035T)</b> GW05_1.6_1.7, GW04_6.0_6.1, SB15_0.5_0.6,	GW04_0.5_0.6, SB14_0.5_0.6, SB15_2.0_2.1	08-Dec-2016	15-Dec-2016	05-Jan-2017	✔	16-Dec-2016	05-Jan-2017	✔
<b>EP004: Organic Matter</b>								
<b>HDPE Soil Jar (EP004)</b> SB06_2.0_2.1		06-Dec-2016	14-Dec-2016	13-Dec-2016	✘	14-Dec-2016	11-Jan-2017	✔
<b>HDPE Soil Jar (EP004)</b> GW05_3.4_3.5		08-Dec-2016	14-Dec-2016	15-Dec-2016	✔	14-Dec-2016	11-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EP004)</b> SB07_3.0_3.1, SB09_0.5_0.6	SB08_2.0_2.1,	05-Dec-2016	14-Dec-2016	02-Jan-2017	✔	14-Dec-2016	02-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EP004)</b> GW02_0.5_0.6,	SB10_2.3_2.5	06-Dec-2016	14-Dec-2016	03-Jan-2017	✔	14-Dec-2016	03-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EP004)</b> GW03_5.0_5.1, SB12_0.5_0.6,	SB11_1.0_1.1, SB13_2.0_2.1	07-Dec-2016	14-Dec-2016	04-Jan-2017	✔	14-Dec-2016	04-Jan-2017	✔
<b>Soil Glass Jar - Unpreserved (EP004)</b> GW04_0.5_0.6, SB15_0.5_0.6	SB14_0.5_0.6,	08-Dec-2016	14-Dec-2016	05-Jan-2017	✔	14-Dec-2016	05-Jan-2017	✔



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
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>							
<b>HDPE Soil Jar (EP075(SIM))</b> SB06_2.0_2.1, SB09_4.0_4.1	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP075(SIM))</b> SB14_2.0_2.1	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP075(SIM))</b> GW05_3.4_3.5	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> BD1_051216	05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> GW03_0.0_0.1, GW03_5.0_5.1	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> SB14_0.5_0.6, SB15_2.0_2.1	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b> GW05_1.6_1.7, GW04_6.0_6.1	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓



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	
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>HDPE Soil Jar (EP071)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP080)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>HDPE Soil Jar (EP080)</b> SB14_2.0_2.1		08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>HDPE Soil Jar (EP071)</b> SB14_2.0_2.1		08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP071)</b> GW05_3.4_3.5		08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP080)</b> GW05_3.4_3.5		08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> BD1_051216		05-Dec-2016	12-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> BD1_051216		05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	SB07_3.0_3.1, SB08_2.0_2.1,	05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	SB07_3.0_3.1, SB08_2.0_2.1,	05-Dec-2016	14-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW02_6.0_6.1, GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW02_6.0_6.1, GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	12-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW03_0.0_0.1,	GW03_5.0_5.1	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓



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	
<b>EP080/071: Total Petroleum Hydrocarbons - Continued</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW03_0.0_0.1,	GW03_5.0_5.1	07-Dec-2016	14-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB14_0.5_0.6, SB15_2.0_2.1	SB15_0.5_0.6,	08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB14_0.5_0.6, SB15_2.0_2.1	SB15_0.5_0.6,	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW05_1.6_1.7, GW04_6.0_6.1	GW04_0.5_0.6,	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW05_1.6_1.7, GW04_6.0_6.1	GW04_0.5_0.6,	08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> TRIP SPIKE 7,	TSC	28-Nov-2016	12-Dec-2016	12-Dec-2016	✓	12-Dec-2016	12-Dec-2016	✓





Matrix: SOIL

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>HDPE Soil Jar (EP071)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP080)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>HDPE Soil Jar (EP080)</b> SB14_2.0_2.1		08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>HDPE Soil Jar (EP071)</b> SB14_2.0_2.1		08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP071)</b> GW05_3.4_3.5		08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>HDPE Soil Jar (EP080)</b> GW05_3.4_3.5		08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> BD1_051216		05-Dec-2016	12-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> BD1_051216		05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	SB07_3.0_3.1, SB08_2.0_2.1,	05-Dec-2016	13-Dec-2016	19-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	SB07_3.0_3.1, SB08_2.0_2.1,	05-Dec-2016	14-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW02_6.0_6.1, GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	13-Dec-2016	20-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW02_6.0_6.1, GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	12-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW03_0.0_0.1,	GW03_5.0_5.1	07-Dec-2016	13-Dec-2016	21-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓



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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW03_0.0_0.1,	GW03_5.0_5.1	07-Dec-2016	14-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB14_0.5_0.6, SB15_2.0_2.1	SB15_0.5_0.6,	08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> SB14_0.5_0.6, SB15_2.0_2.1	SB15_0.5_0.6,	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	14-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP071)</b> GW05_1.6_1.7, GW04_6.0_6.1	GW04_0.5_0.6,	08-Dec-2016	13-Dec-2016	22-Dec-2016	✓	15-Dec-2016	22-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW05_1.6_1.7, GW04_6.0_6.1	GW04_0.5_0.6,	08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> TRIP SPIKE 7,	TSC	28-Nov-2016	12-Dec-2016	12-Dec-2016	✓	12-Dec-2016	12-Dec-2016	✓



Matrix: SOIL

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP080: BTEXN</b>								
<b>HDPE Soil Jar (EP080)</b> SB06_2.0_2.1,	SB09_4.0_4.1	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>HDPE Soil Jar (EP080)</b> SB14_2.0_2.1		08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>HDPE Soil Jar (EP080)</b> GW05_3.4_3.5		08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> BD1_051216		05-Dec-2016	12-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB07_0.5_0.6, SB08_0.0_0.15, SB09_0.5_0.6	SB07_3.0_3.1, SB08_2.0_2.1,	05-Dec-2016	14-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6, SB10_2.3_2.5	GW02_6.0_6.1, GW01_0.5_0.6, SB10_0.0_0.1,	06-Dec-2016	14-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB11_0.5_0.6, SB12_0.0_0.1, SB13_0.5_0.6,	SB11_1.0_1.1, SB12_0.5_0.6, SB13_2.0_2.1	07-Dec-2016	12-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW03_0.0_0.1,	GW03_5.0_5.1	07-Dec-2016	14-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> SB14_0.5_0.6, SB15_2.0_2.1	SB15_0.5_0.6,	08-Dec-2016	12-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> GW05_1.6_1.7, GW04_6.0_6.1	GW04_0.5_0.6,	08-Dec-2016	14-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b> TRIP SPIKE 7,	TSC	28-Nov-2016	12-Dec-2016	12-Dec-2016	✓	12-Dec-2016	12-Dec-2016	✓



Matrix: SOIL

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b> SB07_3.0_3.1, SB08_5.0_5.1,	SB08_0.5_0.6, SB09_0.0_0.1	05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB07_0.5_0.6		05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB09_4.0_4.1, SB10_2.3_2.5,	SB10_0.0_0.1, SB11_5.4-5.5	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6,	GW02_5.0_5.1, GW01_4.0_4.1, SB06_5.0_5.1	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB11_1.0_1.1, SB12_5.6_5.7, SB13_2.0_2.1	SB12_0.0_0.1, SB13_0.5_0.6,	07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW03_0.0_0.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB14_3.0_3.1,	SB15_1.0_1.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW05_1.6_1.7, GW04_0.5_0.6,	GW05_3.4_3.5, GW04_6.0_6.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Snap Lock Bag (EP231X)</b> SB07_ASHPALT_0.0_0.3		05-Dec-2016	18-Dec-2016	03-Jun-2017	✓	18-Dec-2016	27-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> GW03_5.0_5.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> SB14_0.5_0.6,	SB15_5.0_5.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓





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	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b> SB07_3.0_3.1, SB08_5.0_5.1,	SB08_0.5_0.6, SB09_0.0_0.1	05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB07_0.5_0.6		05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB09_4.0_4.1, SB10_2.3_2.5,	SB10_0.0_0.1, SB11_5.4-5.5	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6,	GW02_5.0_5.1, GW01_4.0_4.1, SB06_5.0_5.1	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB11_1.0_1.1, SB12_5.6_5.7, SB13_2.0_2.1	SB12_0.0_0.1, SB13_0.5_0.6,	07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW03_0.0_0.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB14_3.0_3.1,	SB15_1.0_1.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW05_1.6_1.7, GW04_0.5_0.6,	GW05_3.4_3.5, GW04_6.0_6.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Snap Lock Bag (EP231X)</b> SB07_ASHPALT_0.0_0.3		05-Dec-2016	18-Dec-2016	03-Jun-2017	✓	18-Dec-2016	27-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> GW03_5.0_5.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> SB14_0.5_0.6,	SB15_5.0_5.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓



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	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
<b>HDPE Soil Jar (EP231X)</b> SB07_3.0_3.1, SB08_5.0_5.1,	SB08_0.5_0.6, SB09_0.0_0.1	05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB07_0.5_0.6		05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB09_4.0_4.1, SB10_2.3_2.5,	SB10_0.0_0.1, SB11_5.4-5.5	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6,	GW02_5.0_5.1, GW01_4.0_4.1, SB06_5.0_5.1	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB11_1.0_1.1, SB12_5.6_5.7, SB13_2.0_2.1	SB12_0.0_0.1, SB13_0.5_0.6,	07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW03_0.0_0.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB14_3.0_3.1,	SB15_1.0_1.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW05_1.6_1.7, GW04_0.5_0.6,	GW05_3.4_3.5, GW04_6.0_6.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Snap Lock Bag (EP231X)</b> SB07_ASHPALT_0.0_0.3		05-Dec-2016	18-Dec-2016	03-Jun-2017	✓	18-Dec-2016	27-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> GW03_5.0_5.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> SB14_0.5_0.6,	SB15_5.0_5.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓



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	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b> SB07_3.0_3.1, SB08_5.0_5.1,	SB08_0.5_0.6, SB09_0.0_0.1	05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB07_0.5_0.6		05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB09_4.0_4.1, SB10_2.3_2.5,	SB10_0.0_0.1, SB11_5.4-5.5	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6,	GW02_5.0_5.1, GW01_4.0_4.1, SB06_5.0_5.1	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB11_1.0_1.1, SB12_5.6_5.7, SB13_2.0_2.1	SB12_0.0_0.1, SB13_0.5_0.6,	07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW03_0.0_0.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB14_3.0_3.1,	SB15_1.0_1.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW05_1.6_1.7, GW04_0.5_0.6,	GW05_3.4_3.5, GW04_6.0_6.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Snap Lock Bag (EP231X)</b> SB07_ASHPALT_0.0_0.3		05-Dec-2016	18-Dec-2016	03-Jun-2017	✓	18-Dec-2016	27-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> GW03_5.0_5.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> SB14_0.5_0.6,	SB15_5.0_5.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓



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	
<b>EP231P: PFAS Sums</b>								
<b>HDPE Soil Jar (EP231X)</b> SB07_3.0_3.1, SB08_5.0_5.1,	SB08_0.5_0.6, SB09_0.0_0.1	05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB07_0.5_0.6		05-Dec-2016	15-Dec-2016	03-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB09_4.0_4.1, SB10_2.3_2.5,	SB10_0.0_0.1, SB11_5.4-5.5	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW02_0.5_0.6, GW01_0.0_0.2, SB06_0.5_0.6,	GW02_5.0_5.1, GW01_4.0_4.1, SB06_5.0_5.1	06-Dec-2016	15-Dec-2016	04-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB11_1.0_1.1, SB12_5.6_5.7, SB13_2.0_2.1	SB12_0.0_0.1, SB13_0.5_0.6,	07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW03_0.0_0.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> SB14_3.0_3.1,	SB15_1.0_1.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓
<b>HDPE Soil Jar (EP231X)</b> GW05_1.6_1.7, GW04_0.5_0.6,	GW05_3.4_3.5, GW04_6.0_6.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Snap Lock Bag (EP231X)</b> SB07_ASHPALT_0.0_0.3		05-Dec-2016	18-Dec-2016	03-Jun-2017	✓	18-Dec-2016	27-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> GW03_5.0_5.1		07-Dec-2016	15-Dec-2016	05-Jun-2017	✓	16-Dec-2016	24-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP231X)</b> SB14_0.5_0.6,	SB15_5.0_5.1	08-Dec-2016	15-Dec-2016	06-Jun-2017	✓	15-Dec-2016	24-Jan-2017	✓

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b> RB_071216		07-Dec-2016	16-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b> RB_081216		08-Dec-2016	16-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
<b>Clear glass VOC vial - HCl (EP080)</b> RB_051216		05-Dec-2016	16-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
<b>Clear glass VOC vial - HCl (EP080)</b> RB_061216		06-Dec-2016	16-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓





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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>							
Amber VOC Vial - Sulfuric Acid (EP080) RB_071216	07-Dec-2016	16-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB_081216	08-Dec-2016	16-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
Clear glass VOC vial - HCl (EP080) RB_051216	05-Dec-2016	16-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
Clear glass VOC vial - HCl (EP080) RB_061216	06-Dec-2016	16-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>EP080: BTEXN</b>							
Amber VOC Vial - Sulfuric Acid (EP080) RB_071216	07-Dec-2016	16-Dec-2016	21-Dec-2016	✓	16-Dec-2016	21-Dec-2016	✓
Amber VOC Vial - Sulfuric Acid (EP080) RB_081216	08-Dec-2016	16-Dec-2016	22-Dec-2016	✓	16-Dec-2016	22-Dec-2016	✓
Clear glass VOC vial - HCl (EP080) RB_051216	05-Dec-2016	16-Dec-2016	19-Dec-2016	✓	16-Dec-2016	19-Dec-2016	✓
Clear glass VOC vial - HCl (EP080) RB_061216	06-Dec-2016	16-Dec-2016	20-Dec-2016	✓	16-Dec-2016	20-Dec-2016	✓
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
Clear Plastic Bottle - Natural (EP231X) RB_071216	07-Dec-2016	----	----	----	13-Dec-2016	05-Jun-2017	✓
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
Clear Plastic Bottle - Natural (EP231X) RB_071216	07-Dec-2016	----	----	----	13-Dec-2016	05-Jun-2017	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
Clear Plastic Bottle - Natural (EP231X) RB_071216	07-Dec-2016	----	----	----	13-Dec-2016	05-Jun-2017	✓
<b>EP231P: PFAS Sums</b>							
Clear Plastic Bottle - Natural (EP231X) RB_071216	07-Dec-2016	----	----	----	13-Dec-2016	05-Jun-2017	✓



## Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Exchangeable Cations	ED007	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	2	1	200.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055-103	6	60	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	5	40	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	4	28	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	39	10.26	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	6	59	10.17	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Exchangeable Cations	ED007	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	40	7.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	59	5.08	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Exchangeable Cations	ED007	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations with pre-treatment	ED008	1	1	100.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	40	7.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	59	5.08	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Organic Matter	EP004	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	40	7.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	39	5.13	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Matrix: **SOIL** Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<i>Analytical Methods</i>							
<b>Matrix Spikes (MS) - Continued</b>							
Total Metals by ICP-AES	EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	3	59	5.08	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER** Evaluation: \* = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<i>Analytical Methods</i>							
<b>Laboratory Duplicates (DUP)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	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
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons (2011) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
Exchangeable Cations with pre-treatment	ED008	SOIL	In house: Referenced to Rayment & Higginson (2011) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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 <sub>2</sub> )(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 <sub>2</sub> 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)
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. 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.
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.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)





<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Higginson (1992) method 15A1. A 1M NH <sub>4</sub> Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
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)
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
Sample Extraction for PFAS	EP231-PR	SOIL	In house
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 <sub>2</sub> SO <sub>4</sub> 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.
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.

## QUALITY CONTROL REPORT

<b>Work Order</b>	<b>: ES1628401</b>	<b>Page</b>	<b>: 1 of 29</b>
<b>Client</b>	<b>: GHD PTY LTD</b>	<b>Laboratory</b>	<b>: Environmental Division Sydney</b>
<b>Contact</b>	<b>: MR BEN ANDERSON</b>	<b>Contact</b>	<b>: Customer Services ES</b>
<b>Address</b>	<b>: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000</b>	<b>Address</b>	<b>: 277-289 Woodpark Road Smithfield NSW Australia 2164</b>
<b>Telephone</b>	<b>: +61 08 6222 8222</b>	<b>Telephone</b>	<b>: +61-2-8784 8555</b>
<b>Project</b>	<b>: ALBION PARK</b>	<b>Date Samples Received</b>	<b>: 09-Dec-2016</b>
<b>Order number</b>	<b>: 21-25583/02</b>	<b>Date Analysis Commenced</b>	<b>: 12-Dec-2016</b>
<b>C-O-C number</b>	<b>: ----</b>	<b>Issue Date</b>	<b>: 19-Dec-2016</b>
<b>Sampler</b>	<b>: Matthew West</b>		
<b>Site</b>	<b>: ----</b>		
<b>Quote number</b>	<b>: EN/005/15</b>		
<b>No. of samples received</b>	<b>: 123</b>		
<b>No. of samples analysed</b>	<b>: 49</b>		



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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
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Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
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## 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				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EA002 : pH (Soils) (QC Lot: 687598)</b>									
ES1628079-001	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.6	7.6	0.00	0% - 20%
<b>EA002 : pH (Soils) (QC Lot: 689161)</b>									
ME1601728-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	7.5	7.6	0.00	0% - 20%
<b>EA002 : pH (Soils) (QC Lot: 691006)</b>									
ES1628401-006	GW05_3.4_3.5	EA002: pH Value	----	0.1	pH Unit	5.0	5.0	0.00	0% - 20%
ES1628554-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	8.2	7.6	8.61	0% - 20%
<b>EA055: Moisture Content (QC Lot: 689905)</b>									
ES1628279-025	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	15.4	14.8	4.08	0% - 50%
ES1628279-041	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	3.3	4.0	19.9	No Limit
<b>EA055: Moisture Content (QC Lot: 689906)</b>									
ES1628401-031	GW02_5.0_5.1	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	23.1	22.1	4.68	0% - 20%
ES1628401-057	SB08_0.0_0.15	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	9.7	8.8	9.45	No Limit
<b>EA055: Moisture Content (QC Lot: 689907)</b>									
ES1628401-082	SB11_0.5_0.6	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	12.8	13.3	3.88	0% - 50%
ES1628401-106	SB15_0.5_0.6	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	14.7	15.4	4.53	0% - 50%
<b>ED007: Exchangeable Cations (QC Lot: 697920)</b>									
ES1628143-001	Anonymous	ED007: Exchangeable Calcium	----	0.1	meq/100g	9.5	8.8	7.43	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	2.0	2.0	0.00	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.5	0.5	0.00	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	1.9	1.8	0.00	0% - 50%
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	13.9	13.1	6.08	0% - 20%
ES1628401-060	SB08_2.0_2.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	7.2	7.5	3.34	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	0.2	0.2	0.00	No Limit



Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>ED007: Exchangeable Cations (QC Lot: 697920) - continued</b>									
ES1628401-060	SB08_2.0_2.1	ED007: Exchangeable Sodium	----	0.1	meq/100g	4.3	4.7	8.16	0% - 20%
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	11.9	12.6	5.20	0% - 20%
<b>ED008: Exchangeable Cations (QC Lot: 694077)</b>									
ES1628143-001	Anonymous	ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
ES1628401-053	SB07_3.0_3.1	ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	<0.1	0.00	0% - 20%
<b>EG005T: Total Metals by ICP-AES (QC Lot: 693466)</b>									
ES1627937-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	3	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	5	55.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	5	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	7	6	20.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	29	18	47.6	No Limit
ES1628401-041	SB06_0.5_0.6	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	22	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	6	4	24.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	26	33	24.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	15	13	17.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	17	9	59.9	No Limit
<b>EG005T: Total Metals by ICP-AES (QC Lot: 693468)</b>									
ES1628401-082	SB11_0.5_0.6	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	21	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	4	3	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	8	19.8	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
ES1628401-113	BD1_051216	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	10	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	5	5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<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 (%)		
<b>EG005T: Total Metals by ICP-AES (QC Lot: 693468) - continued</b>											
ES1628401-113	BD1_051216	EG005T: Copper	7440-50-8	5	mg/kg	64	49	25.8	0% - 50%		
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit		
		EG005T: Zinc	7440-66-6	5	mg/kg	28	29	0.00	No Limit		
<b>EG035T: Total Recoverable Mercury by FIMS (QC Lot: 693467)</b>											
ES1627937-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit		
ES1628401-041	SB06_0.5_0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit		
<b>EG035T: Total Recoverable Mercury by FIMS (QC Lot: 693469)</b>											
ES1628401-082	SB11_0.5_0.6	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit		
ES1628401-113	BD1_051216	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit		
<b>EP004: Organic Matter (QC Lot: 689655)</b>											
ES1628279-010	Anonymous	EP004: Total Organic Carbon	----	0.5	%	1.1	1.1	0.00	No Limit		
ES1628401-043	SB06_2.0_2.1	EP004: Total Organic Carbon	----	0.5	%	0.8	0.8	0.00	No Limit		
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 687685)</b>											
ES1628401-004	GW05_1.6_1.7	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		
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit		
		ES1628401-041	SB06_0.5_0.6	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		





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 (%)
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 687685) - continued</b>									
ES1628401-041	SB06_0.5_0.6	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	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 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		
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 687699)</b>									
ES1628354-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 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		
ES1628401-086	SB12_0.0_0.1	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



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 (%)
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 687699) - continued</b>									
ES1628401-086	SB12_0.0_0.1	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	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 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
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 687085)</b>									
EB1628872-002	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EB1628916-006	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 687361)</b>									
ES1628401-004	GW05_1.6_1.7	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1628401-041	SB06_0.5_0.6	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 687367)</b>									
ES1628354-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1628354-008	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 687686)</b>									
ES1628401-004	GW05_1.6_1.7	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
ES1628401-041	SB06_0.5_0.6	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
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 687700)</b>									
ES1628354-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1628401-086	SB12_0.0_0.1	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
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687085)</b>									
EB1628872-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	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 (%)	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687085) - continued</b>										
EB1628916-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687361)</b>										
ES1628401-004	GW05_1.6_1.7	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
ES1628401-041	SB06_0.5_0.6	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687367)</b>										
ES1628354-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
ES1628354-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687686)</b>										
ES1628401-004	GW05_1.6_1.7	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	
ES1628401-041	SB06_0.5_0.6	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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 687700)</b>										
ES1628354-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit	
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit	
ES1628401-086	SB12_0.0_0.1	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	
<b>EP080: BTEXN (QC Lot: 687085)</b>										
EB1628872-002	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	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	
EB1628916-006	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit	
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
			106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit			
								EP080: Naphthalene	91-20-3	1
<b>EP080: BTEXN (QC Lot: 687361)</b>										
ES1628401-004	GW05_1.6_1.7	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	



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 (%)
<b>EP080: BTEXN (QC Lot: 687361) - continued</b>									
ES1628401-004	GW05_1.6_1.7	EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1628401-041	SB06_0.5_0.6	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 687367)</b>									
ES1628354-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1628354-008	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 687518)</b>									
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	0.0006	25.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0032	0.0034	6.44	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES1628401-091	SB12_5.6_5.7	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	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 (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 687680)</b>									
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0005	0.0004	21.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0003	0.0002	40.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0021	0.0018	16.0	0% - 50%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0015	0.0010	37.5	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
ES1628401-041	SB06_0.5_0.6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0055	0.0068	22.0	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0070	0.0076	7.59	0% - 50%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.164	0.170	3.58	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0506	0.0583	14.3	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	3.57	3.44	3.64	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0036	0.0042	14.2	No Limit
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 694846)</b>									
EM1615098-070	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	0.0003	30.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0015	0.0012	20.2	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 687518)</b>									
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0003	0.0004	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
		ES1628401-091	SB12_5.6_5.7	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			0.0002	mg/kg	<0.0002	<0.0002	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 (%)
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 687518) - continued</b>									
ES1628401-091	SB12_5.6_5.7	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 687680)</b>									
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0006	0.0006	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
		ES1628401-041	SB06_0.5_0.6	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0036	0.0032
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.0002	mg/kg	0.0163	0.0155	5.03	0% - 20%
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.0002	mg/kg	0.0086	0.0067	25.8	0% - 50%
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1			0.0002	mg/kg	0.0599	0.0590	1.66	0% - 20%
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.001	mg/kg	<0.001	0.003	100	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 694846)</b>									
EM1615098-070	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
		<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 687518)</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	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 (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 687518) - continued</b>									
ES1628401-053	SB07_3.0_3.1	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1628401-091	SB12_5.6_5.7	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 687680)</b>									
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1628401-041	SB06_0.5_0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0018	0.0026	33.3	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 (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 687680) - continued</b>									
ES1628401-041	SB06_0.5_0.6	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	0.00	No Limit
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 694846)</b>									
EM1615098-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 687518)</b>									
ES1628401-053	SB07_3.0_3.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1628401-091	SB12_5.6_5.7	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	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 (%)
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 687518) - continued</b>									
ES1628401-091	SB12_5.6_5.7	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 687680)</b>									
ES1628401-004	GW05_1.6_1.7	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
ES1628401-041	SB06_0.5_0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 694846)</b>									
EM1615098-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 694907)</b>									
ES1628653-032	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1628653-072	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 694907)</b>									
ES1628653-032	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1628653-072	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
<b>EP080: BTEXN (QC Lot: 694907)</b>									
ES1628653-032	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



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 (%)
<b>EP080: BTEXN (QC Lot: 694907) - continued</b>									
ES1628653-032	Anonymous	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
ES1628653-072	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
	91-20-3	5	µg/L	<5	<5	0.00	No Limit		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 689720)</b>									
EB1629099-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1628503-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.05	0.02	84.9	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.13	0.12	9.76	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 689720)</b>									
EB1629099-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.25	0.24	5.34	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.07	0.06	15.6	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.43	0.45	3.62	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.05	0.03	52.6	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1628503-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 689720)</b>									
EB1629099-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	11.4	11.6	1.53	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.18	0.12	37.7	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1628503-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit



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 Work Order : ES1628401  
 Client : GHD PTY LTD  
 Project : ALBION PARK



Sub-Matrix: **WATER**

				<i>Laboratory Duplicate (DUP) Report</i>					
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 689720) - continued</b>									
ES1628503-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>ED007: Exchangeable Cations (QCLot: 697920)</b>									
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	110	76	122	
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	98.2	76	118	
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	108	80	120	
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	110	80	120	
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----	
<b>ED008: Exchangeable Cations (QCLot: 694077)</b>									
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	----	----	----	----	
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	----	----	----	----	
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----	
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----	
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----	
<b>EG005T: Total Metals by ICP-AES (QCLot: 693466)</b>									
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	98.3	86	126	
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	94.0	83	113	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	108	76	128	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	102	86	120	
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	102	80	114	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	103	87	123	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	105	80	122	
<b>EG005T: Total Metals by ICP-AES (QCLot: 693468)</b>									
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	101	86	126	
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	99.5	83	113	
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	113	76	128	
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	99.5	86	120	
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	103	80	114	
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	108	87	123	
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	110	80	122	
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 693467)</b>									
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	79.7	70	105	
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 693469)</b>									
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	80.0	70	105	
<b>EP004: Organic Matter (QCLot: 689655)</b>									
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	# 100	81	99	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 687685)</b>									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	95.5	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	93.9	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	93.8	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	90.5	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	93.1	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	88.2	77	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	96.0	73	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	95.4	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	83.1	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	89.9	75	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	80.4	68	116	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	89.5	74	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	89.5	70	126	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	84.1	61	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	85.5	62	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	84.7	63	121	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 687699)</b>									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	115	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	114	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	114	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	110	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	112	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	108	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	113	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	99.6	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	110	75	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	96.4	68	116	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	110	74	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	109	70	126	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	104	61	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	105	62	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	103	63	121	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687085)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	95.3	68	128	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687361)</b>									



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687361) - continued</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	114	68	128	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687367)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	90.4	68	128	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687686)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	107	75	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	99.4	77	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	100	71	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687700)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	112	75	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	119	77	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	114	71	129	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687085)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	91.5	68	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687361)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	116	68	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687367)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	89.0	68	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687686)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	107	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	100	63	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687700)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	114	77	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	104	74	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	113	63	131	
<b>EP080: BTEXN (QCLot: 687085)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.2	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	94.8	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.4	65	117	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	94.8	66	118	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	94.3	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	96.4	63	119	
<b>EP080: BTEXN (QCLot: 687361)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	98.0	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	105	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	89.6	65	117	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080: BTEXN (QCLot: 687361) - continued</b>									
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	95.6	66	118	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	96.9	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	95.4	63	119	
<b>EP080: BTEXN (QCLot: 687367)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	86.2	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.1	67	121	
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	87.4	65	117	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	92.0	66	118	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	92.4	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	87.2	63	119	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 687518)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	57	121	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.7	55	125	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.6	52	126	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.0	54	123	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	55	127	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.7	54	125	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 687680)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	57	121	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	59.5	55	125	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.1	52	126	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.2	54	123	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.7	55	127	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	54	125	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 694846)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.9	57	121	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.2	55	125	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.4	52	126	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.6	54	123	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	55	127	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	54	125	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687518)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	95.7	52	128	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	54	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	58	127	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.7	57	128	





Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687518) - continued</b>									
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.8	60	134	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	63	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	55	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	62	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	105	53	134	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	49	129	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	59	129	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687680)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	64.1	52	128	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	54	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.9	58	127	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.5	57	128	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	60	134	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	63	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	55	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	62	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.7	53	134	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	49	129	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.0	59	129	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 694846)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	78.4	52	128	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.0	54	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	58	127	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.7	57	128	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.4	60	134	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	63	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	55	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	62	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	53	134	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	49	129	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.0	59	129	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687518)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.8	52	132	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.3	65	126	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.7	64	126	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.1	63	124	



Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687518) - continued</b>									
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.2	58	125	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.9	61	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	55	130	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687680)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	52	132	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	121	65	126	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.9	64	126	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	70.6	63	124	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	71.0	58	125	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	61	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	55	130	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 694846)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	71.0	52	132	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	65	126	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	64	126	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	80.3	63	124	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	73.4	58	125	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	66.3	61	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	61.4	55	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687518)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	120	54	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	102	61	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	62	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	60	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687680)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	54	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.8	61	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	85.8	62	130	



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687680) - continued</b>									
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	60	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 694846)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	91.2	54	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	83.7	61	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	97.7	62	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	65.4	60	130	

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 694907)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	87.6	75	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 694907)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	90.5	75	127	
<b>EP080: BTEXN (QCLot: 694907)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	88.0	70	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	88.2	69	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	91.3	70	120	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	91.4	69	121	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	94.7	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	103	70	120	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689720)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	118	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	117	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	92.6	70	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 689720)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	96.1	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	115	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	96.2	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	84.4	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	107	70	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 689720)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	81.6	70	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	106	70	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	89.6	70	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	105	70	130	



## Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
						Low	High
<b>EG005T: Total Metals by ICP-AES (QCLot: 693466)</b>							
ES1627937-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	98.1	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	101	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	103	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	105	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	96.0	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	97.1	70	130
<b>EG005T: Total Metals by ICP-AES (QCLot: 693468)</b>							
ES1628401-082	SB11_0.5_0.6	EG005T: Arsenic	7440-38-2	50 mg/kg	90.4	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	106	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	111	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	106	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	108	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	106	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	70	130
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 693467)</b>							
ES1627937-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	96.4	70	130
<b>EG035T: Total Recoverable Mercury by FIMS (QCLot: 693469)</b>							
ES1628401-082	SB11_0.5_0.6	EG035T: Mercury	7439-97-6	5 mg/kg	93.2	70	130
<b>EP004: Organic Matter (QCLot: 689655)</b>							
ES1628279-010	Anonymous	EP004: Total Organic Carbon	----	2.66 %	112	70	130
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 687685)</b>							
ES1628401-004	GW05_1.6_1.7	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	87.2	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	98.0	70	130
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 687699)</b>							
ES1628354-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	104	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	114	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687085)</b>							
EB1628872-002	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	103	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687361)</b>							
ES1628401-004	GW05_1.6_1.7	EP080: C6 - C9 Fraction	----	32.5 mg/kg	104	70	130



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687367)</b>							
ES1628354-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687686)</b>							
ES1628401-004	GW05_1.6_1.7	EP071: C10 - C14 Fraction	----	523 mg/kg	77.1	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	90.0	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	100	52	132
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 687700)</b>							
ES1628354-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	75.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	91.0	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	99.9	52	132
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687085)</b>							
EB1628872-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	97.3	70	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687361)</b>							
ES1628401-004	GW05_1.6_1.7	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	108	70	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687367)</b>							
ES1628354-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	106	70	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687686)</b>							
ES1628401-004	GW05_1.6_1.7	EP071: >C10 - C16 Fraction	----	860 mg/kg	77.8	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	100	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	95.8	52	132
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 687700)</b>							
ES1628354-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	79.8	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	97.6	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	87.7	52	132
<b>EP080: BTEXN (QCLot: 687085)</b>							
EB1628872-002	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	102	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	98.5	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	101	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	97.9	70	130
		EP080: ortho-Xylene	106-42-3	2.5 mg/kg	100	70	130
		EP080: Naphthalene	95-47-6	2.5 mg/kg	106	70	130
<b>EP080: BTEXN (QCLot: 687361)</b>							
ES1628401-004	GW05_1.6_1.7	EP080: Benzene	71-43-2	2.5 mg/kg	99.4	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	100	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	94.7	70	130





Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP080: BTEXN (QCLot: 687361) - continued</b>							
ES1628401-004	GW05_1.6_1.7	EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	89.9	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	89.6	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	88.3	70	130
<b>EP080: BTEXN (QCLot: 687367)</b>							
ES1628354-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	91.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	101	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	99.9	70	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	99.3	70	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	100	70	130
EP080: Naphthalene	91-20-3	2.5 mg/kg	100	70	130		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 687518)</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	76.1	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	88.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	82.1	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	89.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	115	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	102	50	130
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 687680)</b>							
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	52.9	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	63.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	80.1	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	114	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	66.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	68.0	50	130
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 694846)</b>							
EM1615098-070	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	57.0	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	59.3	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	73.4	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	83.4	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	114	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	122	50	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687518)</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	80.7	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	88.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	103	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	100	50	130



Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
						Low	High
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687518) - continued</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	105	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	104	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	113	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	96.8	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	108	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	124	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	84.9	30	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 687680)</b>							
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.6	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	100.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	93.1	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	91.7	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	108	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	113	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	77.5	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	59.1	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	59.9	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	84.4	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	58.0	30	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 694846)</b>							
EM1615098-070	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	77.6	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	53.0	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	53.4	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	52.4	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	86.3	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	120	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	97.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	113	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	117	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	95.4	30	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	48.3	30	130
		<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687518)</b>					
ES1628401-053	SB07_3.0_3.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	65.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	68.5	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	54.8	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	55.3	30	130



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687518) - continued</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	72.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	113	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	83.8	30	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 687680)</b>							
ES1628401-004	GW05_1.6_1.7	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	74.5	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	46.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	39.6	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	44.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	33.4	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	91.6	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	106	30	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 694846)</b>							
EM1615098-070	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	54.4	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	89.9	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	109	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.00312 mg/kg	95.2	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	36.9	30	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	60.0	30	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	55.2	30	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687518)</b>							
ES1628401-053	SB07_3.0_3.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	112	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	114	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	105	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	104	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687680)</b>							
ES1628401-004	GW05_1.6_1.7	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	111	50	130



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 687680) - continued</b>							
ES1628401-004	GW05_1.6_1.7	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	124	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	88.4	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	123	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 694846)</b>							
EM1615098-070	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	90.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	90.3	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	86.8	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	63.4	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report				
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 694907)</b>								
ES1628653-058	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	106	70	130	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 694907)</b>								
ES1628653-058	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	108	70	130	
<b>EP080: BTEXN (QCLot: 694907)</b>								
ES1628653-058	Anonymous	EP080: Benzene	71-43-2	25 µg/L	79.0	70	130	
		EP080: Toluene	108-88-3	25 µg/L	88.8	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	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	115	70	130	
	EP080: Naphthalene	91-20-3	25 µg/L	124	70	130		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 689720)</b>								
EB1629099-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	114	50	130	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	99.8	50	130	
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	106	50	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 689720)</b>								
EB1629099-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	74.0	50	130	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	76.2	50	130	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	91.4	50	130	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	77.2	50	130	
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	81.4	50	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 689720)</b>								
EB1629099-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	92.4	50	130	

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 Work Order : ES1628401  
 Client : GHD PTY LTD  
 Project : ALBION PARK



Sub-Matrix: **WATER**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 689720) - continued</b>							
EB1629099-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	# Not Determined	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	130	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	91.4	50	130





CHAIN OF CUSTODY

ALS Laboratory, please tick ->
128 ISSBANE 22nd St...
128 LADSTONE 46 Callenham Drive...

LABORATORY 78 Harbour Road...
128 ISSBANE 22nd St...
128 LADSTONE 46 Callenham Drive...

LABORATORY 277-289 Woodcock Road...
128 ISSBANE 22nd St...
128 LADSTONE 46 Callenham Drive...

LABORATORY 277-289 Woodcock Road...
128 ISSBANE 22nd St...
128 LADSTONE 46 Callenham Drive...

CLIENT: GHD

OFFICE: Sydney

PROJECT: ALPINA Park

ORDER NUMBER: 2125583

PROJECT MANAGER: Ben Anderson

SAMPLER: James Lean

COC Emailed to ALS? (YES / NO)

Email Reports to (will default to PM if no other addresses are listed): Ben.anderson@ghd.com

Email Invoice to (will default to PM if no other addresses are listed): nicole.rosen@ghd.com

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS:
Standard TAT may be longer for some tests
e.g. Ultra Trace Organics

Standard TAT (List due date):
Non Standard or urgent TAT (List due date):

FOR LABORATORY USE ONLY (Circle)
Custom Seal Inlet: Yes/No
Freezer/Frozen for future presentation: Yes/No

PROJECT NO.:

PURCHASE ORDER NO.:

CONTACT PH.:

SAMPLER MOBILE: 0425389666

EDD FORMAT (or default):

RELINQUISHED BY: James Lean

DATE/TIME: 16/02/16

RECEIVED BY: Karl M

DATE/TIME: 16-12-16

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

DATE/TIME:

SAMPLE DETAILS
MATRIX: Solid(s) Water(W)

CONTAINER INFORMATION

ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to attract suite price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Additional Information
Comments on likely contaminant levels, dilutions, or samples requiring specific CC analysis etc.

Table with columns: LAB ID, SAMPLE ID, DATE / TIME, MATRIX, TYPE & PRESERVATIVE, TOTAL BOTTLES, ANALYSIS REQUIRED, etc. Includes handwritten entries for samples 1-12 and a 'TOTAL' row.

Water Container Codes: P = Unpreserved Plastic, N = Nitric Preserved Plastic, ORC = Nitric Preserved ORC, SH = Sodium Hydroxide Preserved Plastic, AG = Amber Glass Unpreserved Plastic, AP = Air-tight Unpreserved Plastic, etc.

Environmental Division
Sydney
Work Order Reference
ES1629123
Barcode
Telephone: +61-2-8784 8655

Please use suites where possible



# CHAIN OF CUSTODY

ALS Laboratory please tick →

**HEAD OFFICE:** 21 Somers Road, Pascoe Vale, VIC 3085  
 Ph: 06 5599 0699 E: als@als.com.au  
**LABORATORY:** 2 Ryde Street, Sandford QLD 4053  
 Ph: 07 3243 7222 E: samples@als.com.au  
**1/1, 1/2 STONE:** 48 Callender Drive, Gilmer QLD 4850  
 Ph: 07 4717 5800 E: pds@als.com.au  
**LABORATORY:** 7171 Harcourt Road, Dandenong VIC 3175  
 Ph: 07 4641 0177 E: mlab@als.com.au  
**LABORATORY:** 244 Weiland Road, Sandhurst VIC 3171  
 Ph: 03 5349 5000 E: samples@als.com.au  
**LABORATORY:** 128 Spring Road, Mandurah NSW 2850  
 Ph: 02 5292 8795 E: mandurah@als.com.au  
**LABORATORY:** 2 East Harbour Road, Mandurah West NSW 2861  
 Ph: 02 4014 2500 E: samples@als.com.au  
**LABORATORY:** 113 Gully Pkwy, North Manna NSW 2541  
 Ph: 02 4925 2000 E: manna@als.com.au  
**LABORATORY:** 10 Hadley Way, Mandurah WA 2000  
 Ph: 08 9200 7558 E: samples@als.com.au  
**LABORATORY:** 277-289 Woodcroft Road, Springvale VIC 3173  
 Ph: 02 8794 6555 E: samples@als.com.au  
**TOWNSVILLE:** 14-15 Deane Court, QLD 4516  
 Ph: 07 4798 0800 E: townsville@als.com.au  
**LABORATORY:** 818 Kenny Street, Wodonga NSW 2800  
 Ph: 02 4228 0125 E: wodonga@als.com.au

CLIENT: **GHD**

OFFICE: **Sydney**

PROJECT: **2125583**

ORDER NUMBER: **2125583**

PROJECT MANAGER: **Ben Anderson**

SAMPLER: **Jones Lean**

COC: **EMailed to ALS? (YES / NO)**

Email Reports to (will default to PM if no other addresses are listed): **Ben.anderson@ghd.com**

Email Invoice to (will default to PM if no other addresses are listed): **Nicole.rosen@ghd.com**

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS:  Standard TAT (List due date):  
 Non Standard or urgent TAT (List due date):

COUNTRY OF ORIGIN: **AUS**

ALS QUOTE NO.:

CONTACT PH: **0425389666**

RELINQUISHED BY: **Jones Lean**

DATE/TIME: **16/00**

RECEIVED BY: **Raul Ar**

DATE/TIME: **16-12-16 1600**

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

DATE/TIME:

FOR LABORATORY USE ONLY (Circle)

Yes No N/A

Comments on likely contaminant levels, dilutions, or samples requiring specific CC analysis etc.

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB: Suite Codes must be listed to attract suite price) Where Matrix are required, specify Total (unfiltered, bottle required) or Dissolved (filtered bottle required).	Additional Information
13	GW01	16/12/16	W		6	Suite M8. PFAS, TRH, BTEX, metals, pH, TDS, major ions, alkalinity C6-C9 + BTEX.	
14	GW02		W		X		
15	GW03		W		X		
16	GW04		W		X		
17	GW05		W		X		
19	GW0A3		W		X		
19, 20, 24	Trip Spices		S/W		round		
21, 22, 25	Trip Beans		S/W		wonky		
23, 26	TSC		W				
27	RB1 - Extra						
TOTAL							

**Water Container Codes:** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved ORC; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic  
 = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Plastic; F = Formic Acid Preserved Glass  
 = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag; LI = Lycopodium Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

## CERTIFICATE OF ANALYSIS

<b>Work Order</b> : <b>ES1629123</b> <b>Client</b> : <b>GHD PTY LTD</b> <b>Contact</b> : <b>MR BEN ANDERSON</b> <b>Address</b> : <b>LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000</b>  <b>Telephone</b> : <b>+61 07 5413 8161</b> <b>Project</b> : <b>Albion Park</b> <b>Order number</b> : <b>2125583</b> <b>C-O-C number</b> : <b>----</b> <b>Sampler</b> : <b>JAMES LEAN</b> <b>Site</b> : <b>----</b> <b>Quote number</b> : <b>EN/005/15</b> <b>No. of samples received</b> : <b>27</b> <b>No. of samples analysed</b> : <b>26</b>	<b>Page</b> : 1 of 24 <b>Laboratory</b> : Environmental Division Sydney <b>Contact</b> : Customer Services ES <b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164  <b>Telephone</b> : +61-2-8784 8555 <b>Date Samples Received</b> : 16-Dec-2016 16:00 <b>Date Analysis Commenced</b> : 18-Dec-2016 <b>Issue Date</b> : 30-Dec-2016 16:44
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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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	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 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.

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

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

- EP071: LOR of sample SS03 have been confirmed by re-extraction and re-analysis.
- EA015 TDS, result has been confirmed for sample 9 by re-analysis.
- TDS by method EA-015 may bias high for sample 7 due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEX compounds spiked at 20 ug/L.
- 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.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS01	SS02	SS03	SS04	SS05
Client sampling date / time				[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	
Compound	CAS Number	LOR	Unit	ES1629123-001	ES1629123-002	ES1629123-003	ES1629123-004	ES1629123-005	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	6.6	6.8	6.6	8.6	5.4	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	28.2	35.0	76.1	25.1	32.9	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	0.6	4.0	12.1	1.8	0.7	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	0.9	<1.0	<0.5	<0.5	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	2.1	<1.0	<0.5	<0.5	
Pyrene	129-00-0	0.5	mg/kg	<0.5	2.0	<1.0	<0.5	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	0.6	<1.0	<0.5	<0.5	
Chrysene	218-01-9	0.5	mg/kg	<0.5	0.7	<1.0	<0.5	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	0.8	<1.0	<0.5	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	0.6	<1.0	<0.5	<0.5	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<1.0	<0.5	<0.5	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	0.7	<1.0	<0.5	<0.5	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	8.4	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	0.8	<0.5	<0.5	<0.5	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	1.0	0.6	0.6	0.6	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.4	1.2	1.2	1.2	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<60	<50	<50	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<110	<100	<100	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<110	<100	<100	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<60	<50	<50	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS01	SS02	SS03	SS04	SS05
Client sampling date / time				[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	
Compound	CAS Number	LOR	Unit	ES1629123-001	ES1629123-002	ES1629123-003	ES1629123-004	ES1629123-005	
				Result	Result	Result	Result	Result	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>									
^ 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	<60	<50	<50	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<60	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<60	<50	<50	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<b>0.0005</b>	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<b>0.0002</b>	<0.0002	<b>0.0027</b>	<0.0002	<b>0.0039</b>	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<b>0.0047</b>	<0.0002	<b>0.112</b>	<b>0.0015</b>	<b>0.0718</b>	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<b>0.0004</b>	<0.0002	<b>0.0014</b>	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<b>0.0031</b>	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<b>0.0007</b>	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<b>0.0006</b>	<0.0002	<b>0.0024</b>	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<b>0.0008</b>	<0.0005	<b>0.0007</b>	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SS01	SS02	SS03	SS04	SS05
Client sampling date / time					[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]	[16-Dec-2016]
Compound	CAS Number	LOR	Unit		ES1629123-001	ES1629123-002	ES1629123-003	ES1629123-004	ES1629123-005
					Result	Result	Result	Result	Result
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0049	<0.0002	0.115	0.0015	0.0757
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0049	<0.0002	0.116	0.0015	0.0845
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%		93.3	95.3	97.0	99.1	83.8
2-Chlorophenol-D4	93951-73-6	0.5	%		89.9	96.1	83.5	88.6	80.9
2,4,6-Tribromophenol	118-79-6	0.5	%		100	100	103	97.5	94.4
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.5	%		91.7	90.1	95.5	94.7	87.6
Anthracene-d10	1719-06-8	0.5	%		108	109	107	107	104
4-Terphenyl-d14	1718-51-0	0.5	%		101	103	90.6	103	108
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		106	80.5	75.7	81.2	75.4
Toluene-D8	2037-26-5	0.2	%		91.7	76.0	83.4	84.1	83.4
4-Bromofluorobenzene	460-00-4	0.2	%		93.6	79.5	81.0	87.6	86.7
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%		99.9	112	103	98.0	110



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SSQA2	Trip Spike 1	Trip Blank 1	TSC 1	Trip Spike 2
Client sampling date / time				[16-Dec-2016]	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629123-006	ES1629123-019	ES1629123-021	ES1629123-023	ES1629123-024	
				Result	Result	Result	Result	Result	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	5.2	----	----	----	----	----
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	37.7	----	----	----	----	----
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	0.6	----	----	----	----	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----	----
^ 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	----	----	----	----	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	40	<10	44	42	
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----	
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----	
C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	46	<10	53	50	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SSQA2	Trip Spike 1	Trip Blank 1	TSC 1	Trip Spike 2
Client sampling date / time				[16-Dec-2016]	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-006	ES1629123-019	ES1629123-021	ES1629123-023	ES1629123-024	
				Result	Result	Result	Result	Result	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	24	<10	25	24	
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	----	----	----	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	----	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	0.3	<0.2	0.3	0.3	
Toluene	108-88-3	0.5	mg/kg	<0.5	10.3	<0.5	12.3	12.1	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1.4	<0.5	1.8	1.8	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	7.2	<0.5	9.1	8.8	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	2.9	<0.5	3.9	3.7	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	22.1	<0.2	27.4	26.7	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	10.1	<0.5	13.0	12.5	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0008	----	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0108	----	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.186	----	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0019	----	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0045	----	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0012	----	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0051	----	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0019	----	----	----	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SSQA2	Trip Spike 1	Trip Blank 1	TSC 1	Trip Spike 2
Client sampling date / time				[16-Dec-2016]	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629123-006	ES1629123-019	ES1629123-021	ES1629123-023	ES1629123-024	
				Result	Result	Result	Result	Result	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<b>0.0006</b>	----	----	----	----	----
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<b>0.197</b>	----	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<b>0.212</b>	----	----	----	----	----
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	<b>93.8</b>	----	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	<b>95.0</b>	----	----	----	----	----
2,4,6-Tribromophenol	118-79-6	0.5	%	<b>101</b>	----	----	----	----	----
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	<b>96.4</b>	----	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	<b>112</b>	----	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	<b>104</b>	----	----	----	----	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	<b>90.8</b>	<b>85.9</b>	<b>100</b>	<b>101</b>	<b>90.9</b>	
Toluene-D8	2037-26-5	0.2	%	<b>78.2</b>	<b>74.4</b>	<b>87.2</b>	<b>91.3</b>	<b>77.4</b>	
4-Bromofluorobenzene	460-00-4	0.2	%	<b>81.7</b>	<b>76.3</b>	<b>88.8</b>	<b>93.2</b>	<b>81.7</b>	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	<b>99.0</b>	----	----	----	----	





## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Trip Blank 2	TSC 2	----	----	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES1629123-025	ES1629123-026	-----	-----	-----	
				Result	Result	----	----	----	
<b>EA002 : pH (Soils)</b>									
pH Value	----	0.1	pH Unit	----	----	----	----	----	
<b>EA055: Moisture Content</b>									
Moisture Content (dried @ 103°C)	----	1	%	----	----	----	----	----	
<b>EP004: Organic Matter</b>									
Total Organic Carbon	----	0.5	%	----	----	----	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	----	
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	----	
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	----	
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	----	
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	----	
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	----	
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	----	
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	----	
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	----	
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	----	
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	----	
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	----	
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	----	
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	----	
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	10	mg/kg	<10	48	----	----	----	
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	----	
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	----	
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	57	----	----	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Trip Blank 2	TSC 2	----	----	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES1629123-025	ES1629123-026	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued</b>									
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	29	----	----	----	
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	----	
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	----	
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	----	
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	0.2	mg/kg	<0.2	0.4	----	----	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	13.1	----	----	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1.9	----	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	9.4	----	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	3.8	----	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	28.6	----	----	----	
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	13.2	----	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	----	----	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	----	----	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	----	----	



## Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	Trip Blank 2	TSC 2	----	----	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES1629123-025	ES1629123-026	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued</b>									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	----	----	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	----	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	----	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	----	
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	----	
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	98.8	97.9	----	----	----	
Toluene-D8	2037-26-5	0.2	%	84.2	84.4	----	----	----	
4-Bromofluorobenzene	460-00-4	0.2	%	87.4	88.2	----	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.0002	%	----	----	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-007	ES1629123-008	ES1629123-009	ES1629123-010	ES1629123-011	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	7.54	7.53	7.22	7.39	7.47	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	101	165	107	3440	151	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	27	49	28	38	60	
Total Alkalinity as CaCO3	----	1	mg/L	27	49	28	38	60	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	10	44	12	264	4	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	6	19	13	1500	23	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	7	25	8	44	14	
Magnesium	7439-95-4	1	mg/L	2	5	2	108	5	
Sodium	7440-23-5	1	mg/L	8	11	11	891	24	
Potassium	7440-09-7	1	mg/L	2	2	2	37	4	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	0.002	0.006	0.002	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	0.010	<0.005	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	0.92	2.43	1.18	48.6	1.93	
Total Cations	----	0.01	meq/L	0.91	2.19	1.09	50.8	2.26	
Ionic Balance	----	0.01	%	----	----	----	2.23	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time					16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629123-007	ES1629123-008	ES1629123-009	ES1629123-010	ES1629123-011
					Result	Result	Result	Result	Result
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<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	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1	µg/L		<1.0	<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	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time					16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1629123-007	ES1629123-008	ES1629123-009	ES1629123-010	ES1629123-011	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	<2
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	<5
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	1.39
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.09	<0.02	0.10	<0.02	<0.02	9.41
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.61	<0.01	0.34	0.04	0.04	137
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	2.24
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	<0.02	0.02	<0.02	<0.02	7.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	1.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	3.12
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.77
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.22
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.70	<0.01	0.44	0.04	0.04	146
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.73	<0.01	0.46	0.04	0.04	162
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1	%	18.8	22.9	23.3	24.6	24.6	22.9
2-Chlorophenol-D4	93951-73-6	1	%	40.9	49.8	51.1	51.0	51.0	46.6



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-007	ES1629123-008	ES1629123-009	ES1629123-010	ES1629123-011	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)S: Phenolic Compound Surrogates - Continued</b>									
2,4,6-Tribromophenol	118-79-6	1	%	45.8	40.6	39.6	44.2	40.1	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1	%	56.9	59.4	59.1	60.9	57.8	
Anthracene-d10	1719-06-8	1	%	71.8	58.0	56.0	61.6	52.9	
4-Terphenyl-d14	1718-51-0	1	%	72.9	87.1	87.7	92.4	84.2	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	109	108	104	116	113	
Toluene-D8	2037-26-5	2	%	114	112	110	117	115	
4-Bromofluorobenzene	460-00-4	2	%	100	97.6	96.6	103	103	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	110	89.8	104	75.5	119	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-012	ES1629123-013	ES1629123-014	ES1629123-015	ES1629123-016	
				Result	Result	Result	Result	Result	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	7.47	6.37	4.64	5.25	3.99	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	137	8140	12000	11100	16800	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	72	124	<1	12	<1	
Total Alkalinity as CaCO3	----	1	mg/L	72	124	<1	12	<1	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	457	660	812	1140	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	23	4260	6750	5160	7440	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	16	108	62	54	63	
Magnesium	7439-95-4	1	mg/L	5	228	424	252	528	
Sodium	7440-23-5	1	mg/L	20	2470	3540	2830	3960	
Potassium	7440-09-7	1	mg/L	4	11	5	4	6	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	0.009	0.002	0.018	
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.002	<0.001	0.006	
Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.033	<0.001	0.052	
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.004	<0.001	0.007	
Nickel	7440-02-0	0.001	mg/L	<0.001	0.045	0.121	0.086	0.323	
Zinc	7440-66-6	0.005	mg/L	<0.005	0.110	0.338	0.158	0.744	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	2.17	132	204	163	234	
Total Cations	----	0.01	meq/L	2.18	132	192	147	219	
Ionic Balance	----	0.01	%	----	0.11	3.04	5.19	3.23	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time					16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00
Compound	CAS Number	LOR	Unit		ES1629123-012	ES1629123-013	ES1629123-014	ES1629123-015	ES1629123-016
					Result	Result	Result	Result	Result
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Acenaphthene	83-32-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluorene	86-73-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Phenanthrene	85-01-8	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Anthracene	120-12-7	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Fluoranthene	206-44-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Pyrene	129-00-0	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benz(a)anthracene	56-55-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Chrysene	218-01-9	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(k)fluoranthene	207-08-9	1	µg/L		<1.0	<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	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	53-70-3	1	µg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Benzo(g,h,i)perylene	191-24-2	1	µg/L		<1.0	<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	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<b>150</b>	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<b>150</b>	<50	<50	<50
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<b>140</b>	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<b>140</b>	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<b>140</b>	<100	<100	<100
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-012	ES1629123-013	ES1629123-014	ES1629123-015	ES1629123-016	
				Result	Result	Result	Result	Result	
<b>EP080: BTEXN - Continued</b>									
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2	
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	<2	
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1	
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.42	<0.02	<0.02	0.78	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	9.11	<0.02	<0.02	2.15	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	124	<0.01	<0.01	0.35	<0.01	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.2	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	2.14	<0.02	<0.02	0.25	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	6.79	<0.02	<0.02	0.93	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.79	<0.02	<0.02	0.15	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.99	<0.01	<0.01	0.21	<0.01	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.88	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.20	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	133	<0.01	<0.01	2.50	<0.01	
Sum of PFAS (WA DER List)	----	0.01	µg/L	148	<0.01	<0.01	4.82	<0.01	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1	%	20.6	26.5	25.0	24.6	23.3	
2-Chlorophenol-D4	93951-73-6	1	%	43.3	56.0	50.8	51.7	47.1	





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1629123-012	ES1629123-013	ES1629123-014	ES1629123-015	ES1629123-016	
				Result	Result	Result	Result	Result	
<b>EP075(SIM)S: Phenolic Compound Surrogates - Continued</b>									
2,4,6-Tribromophenol	118-79-6	1	%	40.2	50.2	43.7	43.7	40.9	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1	%	52.6	67.5	59.5	60.7	57.1	
Anthracene-d10	1719-06-8	1	%	52.0	66.0	59.7	60.1	52.9	
4-Terphenyl-d14	1718-51-0	1	%	88.5	90.6	98.2	102	85.6	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	121	112	117	118	100	
Toluene-D8	2037-26-5	2	%	117	110	112	112	95.8	
4-Bromofluorobenzene	460-00-4	2	%	102	98.3	98.6	103	84.1	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	116	107	106	111	84.3	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW05	GWQA3	Trip Spike	Trip Blank	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	----	
Compound	CAS Number	LOR	Unit	ES1629123-017	ES1629123-018	ES1629123-020	ES1629123-022	-----	
				Result	Result	Result	Result	----	
<b>EA005P: pH by PC Titrator</b>									
pH Value	----	0.01	pH Unit	4.55	6.42	----	----	----	
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>									
Total Dissolved Solids @180°C	----	10	mg/L	8220	7780	----	----	----	
<b>ED037P: Alkalinity by PC Titrator</b>									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	121	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	<1	121	----	----	----	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1220	479	----	----	----	
<b>ED045G: Chloride by Discrete Analyser</b>									
Chloride	16887-00-6	1	mg/L	4640	4340	----	----	----	
<b>ED093F: Dissolved Major Cations</b>									
Calcium	7440-70-2	1	mg/L	72	112	----	----	----	
Magnesium	7439-95-4	1	mg/L	267	229	----	----	----	
Sodium	7440-23-5	1	mg/L	2500	2440	----	----	----	
Potassium	7440-09-7	1	mg/L	7	11	----	----	----	
<b>EG020F: Dissolved Metals by ICP-MS</b>									
Arsenic	7440-38-2	0.001	mg/L	0.007	0.001	----	----	----	
Cadmium	7440-43-9	0.0001	mg/L	0.0001	<0.0001	----	----	----	
Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	----	----	----	
Copper	7440-50-8	0.001	mg/L	0.005	0.002	----	----	----	
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	----	----	----	
Nickel	7440-02-0	0.001	mg/L	0.171	0.047	----	----	----	
Zinc	7440-66-6	0.005	mg/L	0.405	0.119	----	----	----	
<b>EG035F: Dissolved Mercury by FIMS</b>									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----	
<b>EN055: Ionic Balance</b>									
Total Anions	----	0.01	meq/L	156	135	----	----	----	
Total Cations	----	0.01	meq/L	134	131	----	----	----	
Ionic Balance	----	0.01	%	7.50	1.49	----	----	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1	µg/L	<1.0	<1.0	----	----	----	
Acenaphthylene	208-96-8	1	µg/L	<1.0	<1.0	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW05	GWQA3	Trip Spike	Trip Blank	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	----	
Compound	CAS Number	LOR	Unit	ES1629123-017	ES1629123-018	ES1629123-020	ES1629123-022	-----	
				Result	Result	Result	Result	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>									
Acenaphthene	83-32-9	1	µg/L	<1.0	<1.0	----	----	----	
Fluorene	86-73-7	1	µg/L	<1.0	<1.0	----	----	----	
Phenanthrene	85-01-8	1	µg/L	<1.0	<1.0	----	----	----	
Anthracene	120-12-7	1	µg/L	<1.0	<1.0	----	----	----	
Fluoranthene	206-44-0	1	µg/L	<1.0	<1.0	----	----	----	
Pyrene	129-00-0	1	µg/L	<1.0	<1.0	----	----	----	
Benz(a)anthracene	56-55-3	1	µg/L	<1.0	<1.0	----	----	----	
Chrysene	218-01-9	1	µg/L	<1.0	<1.0	----	----	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	<1.0	----	----	----	
Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	<1.0	----	----	----	
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	----	----	----	
Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	<1.0	----	----	----	
Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	<1.0	----	----	----	
Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	<1.0	----	----	----	
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	----	----	----	
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	----	----	----	
<b>EP080/071: Total Petroleum Hydrocarbons</b>									
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	<20	----	
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----	
C15 - C28 Fraction	----	100	µg/L	<100	<b>130</b>	----	----	----	
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----	
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<b>130</b>	----	----	----	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>									
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	<b>120</b>	----	----	----	
>C16 - C34 Fraction	----	100	µg/L	<100	<100	----	----	----	
>C34 - C40 Fraction	----	100	µg/L	<100	<100	----	----	----	
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<b>120</b>	----	----	----	
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<b>120</b>	----	----	----	
<b>EP080: BTEXN</b>									
Benzene	71-43-2	1	µg/L	<1	<1	<b>16</b>	<1	----	
Toluene	108-88-3	2	µg/L	<2	<2	<b>15</b>	<2	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW05	GWQA3	Trip Spike	Trip Blank	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	----	
Compound	CAS Number	LOR	Unit	ES1629123-017	ES1629123-018	ES1629123-020	ES1629123-022	-----	
				Result	Result	Result	Result	----	
<b>EP080: BTEXN - Continued</b>									
Ethylbenzene	100-41-4	2	µg/L	<2	<2	14	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	15	<2	----	
ortho-Xylene	95-47-6	2	µg/L	<2	<2	15	<2	----	
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	30	<2	----	
^ Sum of BTEX	----	1	µg/L	<1	<1	75	<1	----	
Naphthalene	91-20-3	5	µg/L	<5	<5	17	<5	----	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>									
Phenol-d6	13127-88-3	1	%	24.5	23.5	----	----	----	
2-Chlorophenol-D4	93951-73-6	1	%	52.4	50.1	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW05	GWQA3	Trip Spike	Trip Blank	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	----	
Compound	CAS Number	LOR	Unit	ES1629123-017	ES1629123-018	ES1629123-020	ES1629123-022	-----	
				Result	Result	Result	Result	----	
<b>EP075(SIM)S: Phenolic Compound Surrogates - Continued</b>									
2,4,6-Tribromophenol	118-79-6	1	%	47.4	44.7	----	----	----	
<b>EP075(SIM)T: PAH Surrogates</b>									
2-Fluorobiphenyl	321-60-8	1	%	64.2	61.0	----	----	----	
Anthracene-d10	1719-06-8	1	%	60.0	59.9	----	----	----	
4-Terphenyl-d14	1718-51-0	1	%	98.2	94.7	----	----	----	
<b>EP080S: TPH(V)/BTEX Surrogates</b>									
1,2-Dichloroethane-D4	17060-07-0	2	%	114	113	112	97.9	----	
Toluene-D8	2037-26-5	2	%	112	110	108	99.8	----	
4-Bromofluorobenzene	460-00-4	2	%	95.8	96.7	103	83.7	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	112	102	----	----	----	





## Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	70	130

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2,4,6-Tribromophenol	118-79-6	17	125
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1629123	Page	: 1 of 13
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: Albion Park	Date Samples Received	: 16-Dec-2016
Site	: ----	Issue Date	: 30-Dec-2016
Sampler	: JAMES LEAN	No. of samples received	: 27
Order number	: 2125583	No. of samples analysed	: 26

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** Matrix Spike outliers occur.
- Laboratory Control outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

#### 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.



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Laboratory Control Spike (LCS) Recoveries</b>							
EP004: Organic Matter	QC-697532-002	----	<b>Total Organic Carbon</b>	----	99.3 %	81-99%	<b>Recovery greater than upper control limit</b>

### Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
<b>EA005P: pH by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural</b>							
SW01, SW03, SW05, GW01, GW03, GW05,	SW02, SW04, SWQA1, GW02, GW04, GWQA3	----	----	----	18-Dec-2016	16-Dec-2016	<b>2</b>

### Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
<b>Laboratory Duplicates (DUP)</b>					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	12	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>					
PAH/Phenols (GC/MS - SIM)	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	12	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

### Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Container / Client Sample ID(s)							



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	
<b>EA002 : pH (Soils)</b>								
<b>Soil Glass Jar - Unpreserved (EA002)</b>								
SS01, SS03, SS05, SS02, SS04, SSQA2	16-Dec-2016	20-Dec-2016	23-Dec-2016	✓	20-Dec-2016	20-Dec-2016	✓	
<b>EA055: Moisture Content</b>								
<b>Soil Glass Jar - Unpreserved (EA055-103)</b>								
SS01, SS03, SS05, SS02, SS04, SSQA2	16-Dec-2016	----	----	----	19-Dec-2016	30-Dec-2016	✓	
<b>EP004: Organic Matter</b>								
<b>Soil Glass Jar - Unpreserved (EP004)</b>								
SS01, SS03, SS05, SS02, SS04, SSQA2	16-Dec-2016	28-Dec-2016	13-Jan-2017	✓	28-Dec-2016	13-Jan-2017	✓	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>								
<b>Soil Glass Jar - Unpreserved (EP075(SIM))</b>								
SS01, SS03, SS05, SS02, SS04, SSQA2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	19-Dec-2016	28-Jan-2017	✓	
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Soil Glass Jar - Unpreserved (EP071)</b>								
SS01, SS03, SS05, SS02, SS04, SSQA2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	19-Dec-2016	28-Jan-2017	✓	
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
SS01, SS03, SS05, Trip Spike 1, TSC 1, Trip Blank 2, SS02, SS04, SSQA2, Trip Blank 1, Trip Spike 2, TSC 2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	20-Dec-2016	30-Dec-2016	✓	



Matrix: **SOIL**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>Soil Glass Jar - Unpreserved (EP071)</b>								
SS01, SS03, SS05,	SS02, SS04, SSQA2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	19-Dec-2016	28-Jan-2017	✓
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
SS01, SS03, SS05, Trip Spike 1, TSC 1, Trip Blank 2,	SS02, SS04, SSQA2, Trip Blank 1, Trip Spike 2, TSC 2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	20-Dec-2016	30-Dec-2016	✓
<b>EP080: BTEXN</b>								
<b>Soil Glass Jar - Unpreserved (EP080)</b>								
SS01, SS03, SS05, Trip Spike 1, TSC 1, Trip Blank 2,	SS02, SS04, SSQA2, Trip Blank 1, Trip Spike 2, TSC 2	16-Dec-2016	19-Dec-2016	30-Dec-2016	✓	20-Dec-2016	30-Dec-2016	✓
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b>								
SS01, SS03, SS05,	SS02, SS04, SSQA2	16-Dec-2016	21-Dec-2016	14-Jun-2017	✓	21-Dec-2016	30-Jan-2017	✓
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b>								
SS01, SS03, SS05,	SS02, SS04, SSQA2	16-Dec-2016	21-Dec-2016	14-Jun-2017	✓	21-Dec-2016	30-Jan-2017	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
<b>HDPE Soil Jar (EP231X)</b>								
SS01, SS03, SS05,	SS02, SS04, SSQA2	16-Dec-2016	21-Dec-2016	14-Jun-2017	✓	21-Dec-2016	30-Jan-2017	✓
<b>EP231P: PFAS Sums</b>								
<b>HDPE Soil Jar (EP231X)</b>								
SS01, SS03, SS05,	SS02, SS04, SSQA2	16-Dec-2016	21-Dec-2016	14-Jun-2017	✓	21-Dec-2016	30-Jan-2017	✓

Matrix: **WATER**

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





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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EA005P: pH by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural (EA005-P)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	18-Dec-2016	16-Dec-2016	*
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C</b>							
<b>Clear Plastic Bottle - Natural (EA015H)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	21-Dec-2016	23-Dec-2016	✓
<b>ED037P: Alkalinity by PC Titrator</b>							
<b>Clear Plastic Bottle - Natural (ED037-P)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	18-Dec-2016	30-Dec-2016	✓
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>							
<b>Clear Plastic Bottle - Natural (ED041G)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	18-Dec-2016	13-Jan-2017	✓
<b>ED045G: Chloride by Discrete Analyser</b>							
<b>Clear Plastic Bottle - Natural (ED045G)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	18-Dec-2016	13-Jan-2017	✓



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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>ED093F: Dissolved Major Cations</b>							
<b>Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	21-Dec-2016	13-Jan-2017	✓
<b>EG020F: Dissolved Metals by ICP-MS</b>							
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	21-Dec-2016	14-Jun-2017	✓
<b>EG035F: Dissolved Mercury by FIMS</b>							
<b>Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	22-Dec-2016	13-Jan-2017	✓
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>							
<b>Amber Glass Bottle - Unpreserved (EP075(SIM))</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	22-Dec-2016	23-Dec-2016	✓	22-Dec-2016	31-Jan-2017	✓



Matrix: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
<b>Amber Glass Bottle - Unpreserved (EP071)</b>								
SW01, SW03, SW05, GW01, GW03, GW05,	SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	22-Dec-2016	23-Dec-2016	✓	22-Dec-2016	31-Jan-2017	✓
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
SW01, SW03, SW05, GW01, GW03, GW05, Trip Blank	SW02, SW04, SWQA1, GW02, GW04, GWQA3,	16-Dec-2016	21-Dec-2016	30-Dec-2016	✓	21-Dec-2016	30-Dec-2016	✓
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions</b>								
<b>Amber Glass Bottle - Unpreserved (EP071)</b>								
SW01, SW03, SW05, GW01, GW03, GW05,	SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	22-Dec-2016	23-Dec-2016	✓	22-Dec-2016	31-Jan-2017	✓
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
SW01, SW03, SW05, GW01, GW03, GW05, Trip Blank	SW02, SW04, SWQA1, GW02, GW04, GWQA3,	16-Dec-2016	21-Dec-2016	30-Dec-2016	✓	21-Dec-2016	30-Dec-2016	✓
<b>EP080: BTEXN</b>								
<b>Amber VOC Vial - Sulfuric Acid (EP080)</b>								
SW01, SW03, SW05, GW01, GW03, GW05, Trip Spike,	SW02, SW04, SWQA1, GW02, GW04, GWQA3, Trip Blank	16-Dec-2016	21-Dec-2016	30-Dec-2016	✓	21-Dec-2016	30-Dec-2016	✓



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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	27-Dec-2016	14-Jun-2017	✓
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	27-Dec-2016	14-Jun-2017	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	27-Dec-2016	14-Jun-2017	✓
<b>EP231P: PFAS Sums</b>							
<b>HDPE (no PTFE) (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	27-Dec-2016	14-Jun-2017	✓



## Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Moisture Content	EA055-103	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Organic Matter	EP004	2	6	33.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Organic Matter	EP004	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Organic Matter	EP004	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Organic Matter	EP004	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<b>Laboratory Duplicates (DUP)</b>							
Alkalinity by PC Titrator	ED037-P	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	0.00	10.00	*	NEPM 2013 B3 & ALS QC Standard





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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP) - Continued</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	3	26	11.54	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	12	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Alkalinity by PC Titrator	ED037-P	2	24	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	18	11.11	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	12	8.33	5.00	✔	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	12	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	12	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	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
pH (1:5)	EA002	SOIL	In house: Referenced to APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
Moisture Content	EA055-103	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Organic Matter	EP004	SOIL	In house: Referenced to AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. 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.
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.
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-House. A portion of soil is extracted with MTBE. The extract is taken to dryness, made up in mobile phase. Analysis is by LC/MSMS, ESI Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
pH by PC Titrator	EA005-P	WATER	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003



Analytical Methods	Method	Matrix	Method Descriptions
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (2013) Schedule B(3)  Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3)  Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
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 <sub>2</sub> )(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 <sub>2</sub> 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)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	In house: Referenced to APHA 1030F. 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)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.
Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	In house: Referenced to AS1289.4.1.1 - 1997. Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
Sample Extraction for PFAS	EP231-PR	SOIL	In house
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.



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na <sub>2</sub> SO <sub>4</sub> 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.
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.

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1629123</b>	<b>Page</b>	: 1 of 14
<b>Client</b>	: <b>GHD PTY LTD</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	: MR BEN ANDERSON	<b>Contact</b>	: Customer Services ES
<b>Address</b>	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
<b>Telephone</b>	: +61 07 5413 8161	<b>Telephone</b>	: +61-2-8784 8555
<b>Project</b>	: Albion Park	<b>Date Samples Received</b>	: 16-Dec-2016
<b>Order number</b>	: 2125583	<b>Date Analysis Commenced</b>	: 18-Dec-2016
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 30-Dec-2016
<b>Sampler</b>	: JAMES LEAN		
<b>Site</b>	: ----		
<b>Quote number</b>	: EN/005/15		
<b>No. of samples received</b>	: 27		
<b>No. of samples analysed</b>	: 26		



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

This Quality Control Report contains the following information:

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

### Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Raymond Commodore	Instrument Chemist	Sydney Inorganics, Smithfield, NSW





## General Comments

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

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

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

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
<b>EA002 : pH (Soils) (QC Lot: 697669)</b>											
ES1629123-001	SS01	EA002: pH Value	----	0.1	pH Unit	6.6	6.5	0.00	0% - 20%		
ES1629144-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	6.1	6.0	0.00	0% - 20%		
<b>EA055: Moisture Content (QC Lot: 697710)</b>											
ES1628993-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	16.5	18.3	10.1	0% - 50%		
ES1629072-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	25.5	27.2	6.18	0% - 20%		
<b>EA055: Moisture Content (QC Lot: 697711)</b>											
ES1629131-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	26.6	27.0	1.36	0% - 20%		
ES1629138-012	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1	%	19.0	18.5	2.53	0% - 50%		
<b>EP004: Organic Matter (QC Lot: 697532)</b>											
ES1629123-001	SS01	EP004: Total Organic Carbon	----	0.5	%	0.6	0.6	0.00	No Limit		
ES1629144-005	Anonymous	EP004: Total Organic Carbon	----	0.5	%	1.6	1.4	13.0	No Limit		
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 696977)</b>											
ES1629123-001	SS01	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						



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 (%)	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 696977) - continued</b>										
ES1629123-001	SS01	EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 696976)</b>										
ES1629123-001	SS01	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	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 697091)</b>										
ES1628953-011	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit	
ES1629123-003	SS03	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 696976)</b>										
ES1629123-001	SS01	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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 697091)</b>										
ES1628953-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
ES1629123-003	SS03	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit	
<b>EP080: BTEXN (QC Lot: 697091)</b>										
ES1628953-011	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit	
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit	
		EP080: meta- & para-Xylene	108-38-3	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	
ES1629123-003	SS03	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			
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 696262)</b>										
ES1629123-001	SS01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	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 (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 696262) - continued</b>									
ES1629123-001	SS01	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0047	0.0039	18.4	0% - 20%
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 696262)</b>									
ES1629123-001	SS01	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 696262)</b>									
ES1629123-001	SS01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EA005P: pH by PC Titrator (QC Lot: 696497)</b>									
ES1629120-001	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.18	6.04	2.29	0% - 20%
ES1629120-010	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	6.33	6.32	0.158	0% - 20%
<b>EA005P: pH by PC Titrator (QC Lot: 696500)</b>									
ES1629123-017	GW05	EA005-P: pH Value	----	0.01	pH Unit	4.55	4.57	0.438	0% - 20%
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 699326)</b>									
ES1629110-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	9250	9810	5.88	0% - 20%
ES1629123-013	GW01	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	8140	7840	3.75	0% - 20%
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 696498)</b>									
ES1629120-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	7	5	30.2	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	7	5	30.2	No Limit
ES1629120-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	5	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	5	5	0.00	No Limit
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 696501)</b>									
ES1629123-017	GW05	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit



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 (%)
<b>ED037P: Alkalinity by PC Titrator (QC Lot: 696501) - continued</b>									
ES1629123-017	GW05	ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 696294)</b>									
ES1629120-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
ES1629123-012	SWQA1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4	4	0.00	No Limit
<b>ED045G: Chloride by Discrete Analyser (QC Lot: 696293)</b>									
ES1629120-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19	18	0.00	0% - 50%
ES1629123-012	SWQA1	ED045G: Chloride	16887-00-6	1	mg/L	23	23	0.00	0% - 20%
<b>ED093F: Dissolved Major Cations (QC Lot: 701367)</b>									
ES1629122-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	14	13	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	27	28	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	112	113	0.944	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	24	0.00	0% - 20%
ES1629123-008	SW02	ED093F: Calcium	7440-70-2	1	mg/L	25	25	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	5	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	11	11	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	2	2	0.00	No Limit
<b>EG020F: Dissolved Metals by ICP-MS (QC Lot: 701368)</b>									
ES1629123-017	GW05	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.007	0.007	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.005	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.171	0.173	1.11	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.405	0.411	1.49	0% - 20%
ES1629123-008	SW02	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	0.002	0.002	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	0.006	0.005	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
<b>EG035F: Dissolved Mercury by FIMS (QC Lot: 701369)</b>									
ES1629123-017	GW05	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1629123-008	SW02	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 699641)</b>									
ES1629117-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1629123-010	SW04	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 699650)</b>									



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 (%)	
<b>EP080/071: Total Petroleum Hydrocarbons (QC Lot: 699650) - continued</b>										
ES1629215-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
ES1629215-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 699641)</b>										
ES1629117-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
ES1629123-010	SW04	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 699650)</b>										
ES1629215-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
ES1629215-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
<b>EP080: BTEXN (QC Lot: 699641)</b>										
ES1629117-001	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	
ES1629123-010	SW04	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							
ES1629123-010	SW04	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	
		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	
<b>EP080: BTEXN (QC Lot: 699650)</b>										
ES1629215-001	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	
ES1629215-006	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							
ES1629215-006	Anonymous	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	
		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	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 704475)</b>										





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 (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 704475) - continued</b>									
ES1629123-007	SW01	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.61	0.64	4.65	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.09	0.08	12.0	No Limit
ES1629123-015	GW03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.35	0.30	15.0	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.78	0.76	3.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	2.15	2.37	9.65	0% - 20%
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 704475)</b>									
ES1629123-007	SW01	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.03	0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1629123-015	GW03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.21	0.21	0.00	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.25	0.24	4.43	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.93	0.94	1.18	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.15	0.15	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 704475)</b>									
ES1629123-007	SW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1629123-015	GW03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit



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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP004: Organic Matter (QCLot: 697532)</b>									
EP004: Total Organic Carbon	----	0.5	%	<0.5	1.46 %	# 99.3	81	99	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 696977)</b>									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	91.4	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	96.7	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	98.0	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	90.7	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	96.2	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	91.2	77	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	95.8	73	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	93.8	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.9	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.9	75	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	93.0	68	116	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	96.6	74	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	93.8	70	126	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	94.4	61	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	95.8	62	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	92.9	63	121	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 696976)</b>									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	93.1	75	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	99.5	77	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	104	71	129	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 697091)</b>									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	109	68	128	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 696976)</b>									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	102	77	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	109	74	138	
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	104	63	131	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 697091)</b>									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	107	68	128	
<b>EP080: BTEXN (QCLot: 697091)</b>									
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	90.8	62	116	
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.4	67	121	



Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
<b>EP080: BTEXN (QCLot: 697091) - continued</b>									
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	86.8	65	117	
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	93.4	66	118	
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	93.3	68	120	
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.1	63	119	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 696262)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	65.0	57	121	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	69.2	52	126	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	55	127	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 696262)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	69.2	52	128	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	54	129	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	58.5	58	127	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	57	128	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	60	134	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 696262)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	71.8	54	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	126	61	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.8	62	130	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	110	60	130	

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
<b>EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 699326)</b>									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 293 mg/L	102 122	87 66	109 126	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 696498)</b>									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	98.0	81	111	
<b>ED037P: Alkalinity by PC Titrator (QCLot: 696501)</b>									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	95.1	81	111	
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 696294)</b>									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	117	82	122	
<b>ED045G: Chloride by Discrete Analyser (QCLot: 696293)</b>									
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	97.4 98.0	81 81	127 127	
<b>ED093F: Dissolved Major Cations (QCLot: 701367)</b>									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.1	80	114	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>ED093F: Dissolved Major Cations (QCLot: 701367) - continued</b>									
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	111	90	116	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	82	120	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	108	85	113	
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 701368)</b>									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.8	85	114	
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.9	84	110	
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.8	85	111	
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.3	81	111	
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.8	83	111	
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.3	82	112	
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.5	81	117	
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 701369)</b>									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.3	83	105	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 697569)</b>									
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	65.3	50	94	
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	68.4	64	114	
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	83.2	62	113	
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	70.0	64	115	
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	73.0	63	116	
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	72.0	64	116	
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	74.9	64	118	
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	75.0	63	118	
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	69.5	64	117	
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	65.3	63	116	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	1	µg/L	<1.0	5 µg/L	65.8	62	119	
	205-82-3								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	67.9	63	115	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	70.4	63	117	
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	70.2	60	118	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	71.2	61	117	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	67.4	59	118	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 697570)</b>									
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	94.1	76	116	
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	90.9	83	109	
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	89.8	75	113	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 699641)</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	78.8	75	127	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 699650)</b>									



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 699650) - continued</b>									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	80.2	75	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 697570)</b>									
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	87.4	76	114	
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	92.9	81	111	
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	98.3	77	119	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 699641)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	78.2	75	127	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 699650)</b>									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	79.8	75	127	
<b>EP080: BTEXN (QCLot: 699641)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	86.9	70	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	91.4	69	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.3	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	92.7	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	93.2	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	91.2	70	120	
<b>EP080: BTEXN (QCLot: 699650)</b>									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	86.5	70	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	87.2	69	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	86.4	70	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	85.7	69	121	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	87.1	72	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	87.2	70	120	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 704475)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	110	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	95.2	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	102	70	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 704475)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	85.5	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	104	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	99.8	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	82.2	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	86.6	70	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 704475)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.2	70	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	103	70	130	





Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 704475) - continued</b>								
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	90.4	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	103	70	130

### Matrix Spike (MS) Report

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

Sub-Matrix: SOIL

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)		
						Low	High	
<b>EP004: Organic Matter (QCLot: 697532)</b>								
ES1629123-001	SS01	EP004: Total Organic Carbon	----	2.66 %	92.4	70	130	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 696977)</b>								
ES1629123-001	SS01	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	86.7	70	130	
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	91.7	70	130	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 696976)</b>								
ES1629123-001	SS01	EP071: C10 - C14 Fraction	----	523 mg/kg	78.4	73	137	
		EP071: C15 - C28 Fraction	----	2319 mg/kg	99.9	53	131	
		EP071: C29 - C36 Fraction	----	1714 mg/kg	106	52	132	
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 697091)</b>								
ES1628953-011	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	96.3	70	130	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 696976)</b>								
ES1629123-001	SS01	EP071: >C10 - C16 Fraction	----	860 mg/kg	85.5	73	137	
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	100	53	131	
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	109	52	132	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 697091)</b>								
ES1628953-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	95.9	70	130	
<b>EP080: BTEXN (QCLot: 697091)</b>								
ES1628953-011	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	80.3	70	130	
		EP080: Toluene	108-88-3	2.5 mg/kg	82.5	70	130	
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	86.5	70	130	
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	89.4	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	88.0	70	130	
EP080: Naphthalene	91-20-3	2.5 mg/kg	89.8	70	130			
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 696262)</b>								



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 696262) - continued</b>							
ES1629123-001	SS01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	99.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	76.2	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	106	50	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 696262)</b>							
ES1629123-001	SS01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	80.3	30	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	79.1	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	61.3	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	89.9	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	118	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 696262)</b>							
ES1629123-001	SS01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	67.7	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	122	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	124	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	108	50	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 696294)</b>							
ES1629120-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	123	70	130
<b>ED045G: Chloride by Discrete Analyser (QCLot: 696293)</b>							
ES1629120-007	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	106	70	130
<b>EG020F: Dissolved Metals by ICP-MS (QCLot: 701368)</b>							
ES1629123-008	SW02	EG020A-F: Arsenic	7440-38-2	1 mg/L	96.2	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.0	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	89.7	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.6	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	91.3	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	91.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	100	70	130
<b>EG035F: Dissolved Mercury by FIMS (QCLot: 701369)</b>							
ES1629123-007	SW01	EG035F: Mercury	7439-97-6	0.01 mg/L	91.4	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 699641)</b>							
ES1629117-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	75.3	70	130
<b>EP080/071: Total Petroleum Hydrocarbons (QCLot: 699650)</b>							
ES1629215-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	79.8	70	130
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 699641)</b>							



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	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 699641) - continued</b>								
ES1629117-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	75.6	70	130	
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 699650)</b>								
ES1629215-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	81.1	70	130	
<b>EP080: BTEXN (QCLot: 699641)</b>								
ES1629117-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	71.3	70	130	
		EP080: Toluene	108-88-3	25 µg/L	84.8	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.3	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	100	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	105	70	130	
	EP080: Naphthalene	91-20-3	25 µg/L	110	70	130		
<b>EP080: BTEXN (QCLot: 699650)</b>								
ES1629215-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	73.9	70	130	
		EP080: Toluene	108-88-3	25 µg/L	82.6	70	130	
		EP080: Ethylbenzene	100-41-4	25 µg/L	97.2	70	130	
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	97.4	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	25 µg/L	101	70	130	
	EP080: Naphthalene	91-20-3	25 µg/L	111	70	130		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 704475)</b>								
ES1629123-007	SW01	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	100	50	130	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	99.8	50	130	
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	120	50	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 704475)</b>								
ES1629123-007	SW01	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	79.7	50	130	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	81.8	50	130	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	77.6	50	130	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	89.4	50	130	
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	111	50	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 704475)</b>								
ES1629123-007	SW01	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	86.4	50	130	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	109	50	130	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	96.2	50	130	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	86.6	50	130	

**Fadi Soro**

**From:** Sepan Mahamad  
**Sent:** Friday, 13 January 2017 12:28 PM  
**To:** Fadi Soro  
**Subject:** FW: ASLP required from lab report ES1628401

Hi Fadi,

Can you please organise rebatch of ES1628401 as per the email below?

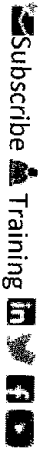
Thanks.

Kind regards,

**Sepan Mahamad**  
Client Services Officer, Environmental  
Sydney



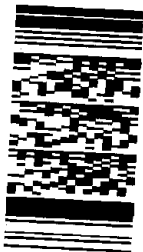
**T** +61 2 8784 8555 **D** +61 2 8784 8534  
**F** +61 2 8784 8500  
[sepan.mahamad@alsglobal.com](mailto:sepan.mahamad@alsglobal.com)  
277-289 Woodpark Road  
Smithfield NSW 2164 Australia



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[www.alsglobal.com](http://www.alsglobal.com)

**From:** Nicole Rosen [mailto:Nicole.Rosen@ghd.com]  
**Sent:** Friday, 13 January 2017 10:29 AM

Environmental Division  
Sydney  
Work Order Reference  
**ES1700845**



Telephone : + 61-2-8784 8656

13/1/17

12:40p

To: Sepan Mahamad <Sepan.Mahamad@alsglobal.com>  
Cc: ALSenviro Sydney <ALSenviro.Sydney@ALSglobal.com>  
Subject: ASLP required from lab report ES1628401

Hi Sepan,  
Albion Park 21/25583/02 – From lab report ES1628401

The following samples are required for ASLP – PFAS full suite

- 1 GW01\_0.0-0.2 33'
- 2 GW02\_0.5-0.6 26'
- 3 GW03\_0.0-0.1 17'
- 4 GW04\_0.5-0.6 10'
- 5 GW05\_1.6-1.7 4'
- 6 SB06\_0.5-0.6 41'
- 7 SB06\_5.0-5.1 46'
- 8 SB07\_3.0-3.1 57'
- 9 SB08\_0.5-0.6 58'
- 10 SB09\_0.0-0.1 65'
- 11 SB09\_4.0-4.1 70'
- 12 SB10\_0.0-0.1 73'
- 12 SB12\_0.0-0.1 86'
- 14 SB13\_0.5-0.6 93'
- 14 SB14\_0.5-0.6 99'
- 16 SB15\_1.0-1.1 107'

5579-588

Thanks,

**Nicole Rosen**  
**Senior Environmental Consultant - Contamination Assessment and Remediation**

**GHD**

T: +61 2 9239 7683 | F: 61 2 9239 7199 | V: 217683 | M: 0421 045 835 | E: [nicole.rosen@ghd.com](mailto:nicole.rosen@ghd.com)  
Level 15 133 Castlereagh St Sydney NSW 2000 Australia | <http://www.ghd.com/>  
Water | Energy & Resources | Environment | Property & Buildings | Transportation



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## CERTIFICATE OF ANALYSIS

**Work Order** : **ES1700845**  
**Client** : **GHD PTY LTD**  
**Contact** : **MR BEN ANDERSON**  
**Address** : **LEVEL 15, 133 CASTLEREAGH STREET**  
**SYDNEY NSW, AUSTRALIA 2000**  
**Telephone** : **+61 07 5413 8161**  
**Project** : **ALBION PARK**  
**Order number** : **21-25583/02**  
**C-O-C number** : **----**  
**Sampler** : **MATTHEW WEST**  
**Site** : **----**  
**Quote number** : **EN/005/15**  
**No. of samples received** : **16**  
**No. of samples analysed** : **16**

**Page** : 1 of 15  
**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** : 13-Jan-2017 12:40  
**Date Analysis Commenced** : 18-Jan-2017  
**Issue Date** : 27-Jan-2017 10:45



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

### Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



## General Comments

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

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

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

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

When 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.

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

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



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	GW01_0.0-0.2	GW02_0.5-0.6	GW03_0.0-0.1	GW04_0.5-0.6	GW05_1.6-1.7
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-001	ES1700845-002	ES1700845-003	ES1700845-004	ES1700845-005	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.05	0.14	0.75	<0.02	<0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.09	0.86	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.49	1.17	9.52	0.06	0.06	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.04	1.47	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.88	1.38	67.4	0.43	0.15	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.04	0.36	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.16	0.14	1.92	<0.02	0.03	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	<0.02	0.42	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.04	1.39	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	GW01_0.0-0.2	GW02_0.5-0.6	GW03_0.0-0.1	GW04_0.5-0.6	GW05_1.6-1.7
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-001	ES1700845-002	ES1700845-003	ES1700845-004	ES1700845-005	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	1.82	3.04	84.1	0.49	0.24	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.37	2.55	76.9	0.49	0.21	
Sum of PFAS (WA DER List)	----	0.01	µg/L	1.71	2.91	81.8	0.49	0.24	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	101	99.9	93.4	112	110	





## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB06_0.5-0.6	SB06_5.0-5.1	SB07_3.0-3.1	SB08_0.5-0.6	SB09_0.0-0.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-006	ES1700845-007	ES1700845-008	ES1700845-009	ES1700845-010	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.48	1.03	<0.02	0.15	1.93	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.42	0.70	<0.02	0.14	1.89	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	8.53	9.67	0.04	1.96	26.0	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.49	0.20	<0.02	0.55	6.58	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	183	1.15	0.71	19.5	524	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	0.03	<0.02	<0.02	<0.02	0.29	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.26	0.22	<0.02	0.05	0.69	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.13	1.31	0.02	0.18	2.77	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.24	0.12	<0.02	0.04	0.37	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.81	0.23	<0.01	0.23	3.13	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.02	<0.02	<0.02	<0.02	0.07	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	0.02	<0.02	<0.02	<0.02	1.27	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB06_0.5-0.6	SB06_5.0-5.1	SB07_3.0-3.1	SB08_0.5-0.6	SB09_0.0-0.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-006	ES1700845-007	ES1700845-008	ES1700845-009	ES1700845-010	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.08	<0.05	<0.05	<0.05	1.35	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	0.18	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	198	14.6	0.77	22.8	570	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	192	10.8	0.75	21.5	550	
Sum of PFAS (WA DER List)	----	0.01	µg/L	196	13.7	0.77	22.1	560	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	89.7	95.8	98.4	104	100	



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB09_4.0-4.1	SB10_0.0-0.1	SB12_0.0-0.1	SB13_0.5-0.6	SB14_0.5-0.6
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-011	ES1700845-012	ES1700845-013	ES1700845-014	ES1700845-015	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.97	0.09	0.32	<0.02	0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.73	0.12	0.10	<0.02	0.04	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	4.78	2.63	0.37	<0.02	0.45	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.41	0.32	<0.02	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	5.88	8.84	0.07	0.17	0.14	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.27	0.35	0.06	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.59	0.65	0.15	<0.02	0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.23	0.19	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.38	0.37	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.05	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB09_4.0-4.1	SB10_0.0-0.1	SB12_0.0-0.1	SB13_0.5-0.6	SB14_0.5-0.6
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-011	ES1700845-012	ES1700845-013	ES1700845-014	ES1700845-015	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	15.2	13.6	1.07	0.17	0.67	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	10.7	11.5	0.44	0.17	0.59	
Sum of PFAS (WA DER List)	----	0.01	µg/L	14.1	13.1	0.97	0.17	0.63	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	96.1	101	103	98.3	99.2	



## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB15_1.0-1.1	----	----	----	----
Client sampling date / time				08-Dec-2016 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1700845-016	-----	-----	-----	-----	-----
				Result	----	----	----	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	----	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	----	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.18	----	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.08	----	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.53	----	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	----	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	----	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	----	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	----	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.05	----	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----	----





## Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	SB15_1.0-1.1	----	----	----	----
Client sampling date / time				08-Dec-2016 00:00	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES1700845-016	-----	-----	-----	-----	
				Result	----	----	----	----	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	3.29	----	----	----	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	2.71	----	----	----	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	3.10	----	----	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	101	----	----	----	----	



### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	GW01_0.0-0.2	GW02_0.5-0.6	GW03_0.0-0.1	GW04_0.5-0.6	GW05_1.6-1.7
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00	08-Dec-2016 00:00
Compound	CAS Number	LOR	Unit	ES1700845-001	ES1700845-002	ES1700845-003	ES1700845-004	ES1700845-005	ES1700845-005
				Result	Result	Result	Result	Result	Result
<b>EN60: Bottle Leaching Procedure</b>									
Final pH	----	0.1	pH Unit	6.5	5.7	6.0	5.8	6.6	6.6



**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB06_0.5-0.6	SB06_5.0-5.1	SB07_3.0-3.1	SB08_0.5-0.6	SB09_0.0-0.1
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	05-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-006	ES1700845-007	ES1700845-008	ES1700845-009	ES1700845-010	
				Result	Result	Result	Result	Result	
<b>EN60: Bottle Leaching Procedure</b>									
Final pH	----	0.1	pH Unit	6.8	6.7	6.8	8.2	7.5	



**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SB09_4.0-4.1	SB10_0.0-0.1	SB12_0.0-0.1	SB13_0.5-0.6	SB14_0.5-0.6
Client sampling date / time				06-Dec-2016 00:00	06-Dec-2016 00:00	07-Dec-2016 00:00	07-Dec-2016 00:00	08-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1700845-011	ES1700845-012	ES1700845-013	ES1700845-014	ES1700845-015	
				Result	Result	Result	Result	Result	
<b>EN60: Bottle Leaching Procedure</b>									
Final pH	----	0.1	pH Unit	6.8	7.0	7.0	5.6	7.0	



### Analytical Results

Sub-Matrix: <b>SOIL</b> (Matrix: <b>SOIL</b> )			Client sample ID	<b>SB15_1.0-1.1</b>	----	----	----	----
			Client sampling date / time	08-Dec-2016 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	<b>ES1700845-016</b>	-----	-----	-----	-----
				Result	----	----	----	----
<b>EN60: Bottle Leaching Procedure</b>								
<b>Final pH</b>	----	0.1	pH Unit	<b>5.4</b>	----	----	----	----





### Surrogate Control Limits

Sub-Matrix: DI WATER LEACHATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1700845	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR BEN ANDERSON	Telephone	: +61-2-8784 8555
Project	: ALBION PARK	Date Samples Received	: 13-Jan-2017
Site	: ----	Issue Date	: 27-Jan-2017
Sampler	: MATTHEW WEST	No. of samples received	: 16
Order number	: 21-25583/02	No. of samples analysed	: 16

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

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

### Summary of Outliers

#### Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

#### Outliers : Analysis Holding Time Compliance

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

#### Outliers : Frequency of Quality Control Samples

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



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1700845--003	GW03_0.0-0.1	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP1700173--004	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	ES1700845--003	GW03_0.0-0.1	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

### Analysis Holding Time Compliance

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

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

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

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

Matrix: **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
<b>EN60: Bottle Leaching Procedure</b>							
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> SB07_3.0-3.1, SB08_0.5-0.6, SB09_0.0-0.1	05-Dec-2016	20-Jan-2017	03-Jun-2017	✓	----	----	----
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> GW01_0.0-0.2, GW02_0.5-0.6	06-Dec-2016	18-Jan-2017	04-Jun-2017	✓	----	----	----
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> SB06_0.5-0.6, SB09_4.0-4.1, SB06_5.0-5.1, SB10_0.0-0.1	06-Dec-2016	20-Jan-2017	04-Jun-2017	✓	----	----	----
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> SB12_0.0-0.1, SB13_0.5-0.6	07-Dec-2016	20-Jan-2017	05-Jun-2017	✓	----	----	----
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> GW03_0.0-0.1	07-Dec-2016	23-Jan-2017	05-Jun-2017	✓	----	----	----
<b>Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN60-D1a)</b> GW04_0.5-0.6, SB14_0.5-0.6, GW05_1.6-1.7, SB15_1.0-1.1	08-Dec-2016	20-Jan-2017	06-Jun-2017	✓	----	----	----

Matrix: **WATER**

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



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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> GW01_0.0-0.2, GW02_0.5-0.6	18-Jan-2017	----	----	----	19-Jan-2017	17-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW04_0.5-0.6, SB06_0.5-0.6, SB07_3.0-3.1, SB09_0.0-0.1, SB10_0.0-0.1, SB13_0.5-0.6, SB15_1.0-1.1 GW05_1.6-1.7, SB06_5.0-5.1, SB08_0.5-0.6, SB09_4.0-4.1, SB12_0.0-0.1, SB14_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW03_0.0-0.1	23-Jan-2017	----	----	----	24-Jan-2017	22-Jul-2017	✓
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> GW01_0.0-0.2, GW02_0.5-0.6	18-Jan-2017	----	----	----	19-Jan-2017	17-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW04_0.5-0.6, SB06_0.5-0.6, SB07_3.0-3.1, SB09_0.0-0.1, SB10_0.0-0.1, SB13_0.5-0.6, SB15_1.0-1.1 GW05_1.6-1.7, SB06_5.0-5.1, SB08_0.5-0.6, SB09_4.0-4.1, SB12_0.0-0.1, SB14_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW03_0.0-0.1	23-Jan-2017	----	----	----	24-Jan-2017	22-Jul-2017	✓
<b>EP231C: Perfluoroalkyl Sulfonamides</b>							
<b>HDPE (no PTFE) (EP231X)</b> GW01_0.0-0.2, GW02_0.5-0.6	18-Jan-2017	----	----	----	19-Jan-2017	17-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW04_0.5-0.6, SB06_0.5-0.6, SB07_3.0-3.1, SB09_0.0-0.1, SB10_0.0-0.1, SB13_0.5-0.6, SB15_1.0-1.1 GW05_1.6-1.7, SB06_5.0-5.1, SB08_0.5-0.6, SB09_4.0-4.1, SB12_0.0-0.1, SB14_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW03_0.0-0.1	23-Jan-2017	----	----	----	24-Jan-2017	22-Jul-2017	✓



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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
<b>HDPE (no PTFE) (EP231X)</b> GW01_0.0-0.2, GW02_0.5-0.6	18-Jan-2017	----	----	----	19-Jan-2017	17-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW04_0.5-0.6, SB06_0.5-0.6, SB07_3.0-3.1, SB09_0.0-0.1, SB10_0.0-0.1, SB13_0.5-0.6, SB15_1.0-1.1 GW05_1.6-1.7, SB06_5.0-5.1, SB08_0.5-0.6, SB09_4.0-4.1, SB12_0.0-0.1, SB14_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW03_0.0-0.1	23-Jan-2017	----	----	----	24-Jan-2017	22-Jul-2017	✓
<b>EP231P: PFAS Sums</b>							
<b>HDPE (no PTFE) (EP231X)</b> GW01_0.0-0.2, GW02_0.5-0.6	18-Jan-2017	----	----	----	19-Jan-2017	17-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW04_0.5-0.6, SB06_0.5-0.6, SB07_3.0-3.1, SB09_0.0-0.1, SB10_0.0-0.1, SB13_0.5-0.6, SB15_1.0-1.1 GW05_1.6-1.7, SB06_5.0-5.1, SB08_0.5-0.6, SB09_4.0-4.1, SB12_0.0-0.1, SB14_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>HDPE (no PTFE) (EP231X)</b> GW03_0.0-0.1	23-Jan-2017	----	----	----	24-Jan-2017	22-Jul-2017	✓





## 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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	5	38	13.16	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	7.89	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	7.89	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	38	7.89	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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Deionised Water Leach	EN60-D1a	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1700845</b>	<b>Page</b>	: 1 of 14
<b>Client</b>	: <b>GHD PTY LTD</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	: MR BEN ANDERSON	<b>Contact</b>	: Customer Services ES
<b>Address</b>	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
<b>Telephone</b>	: +61 07 5413 8161	<b>Telephone</b>	: +61-2-8784 8555
<b>Project</b>	: ALBION PARK	<b>Date Samples Received</b>	: 13-Jan-2017
<b>Order number</b>	: 21-25583/02	<b>Date Analysis Commenced</b>	: 18-Jan-2017
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 27-Jan-2017
<b>Sampler</b>	: MATTHEW WEST		
<b>Site</b>	: ----		
<b>Quote number</b>	: EN/005/15		
<b>No. of samples received</b>	: 16		
<b>No. of samples analysed</b>	: 16		



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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



## General Comments

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

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

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

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 726282)</b>									
EP1700173-004	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	46.3	45.2	2.29	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.25	0.25	0.00	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.14	0.13	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.33	1.28	4.22	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.08	0.08	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 728892)</b>									
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.43	0.46	6.35	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.06	0.05	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1700845-014	SB13_0.5-0.6	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.17	0.18	0.00	0% - 50%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 731237)</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	67.4	67.7	0.324	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.75	0.77	2.89	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.86	0.85	0.00	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	9.52	9.88	3.70	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 (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 731237) - continued</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.47	1.40	4.45	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
ES1701175-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	671	699	4.12	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	11.3	11.4	1.32	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	9.11	9.21	1.09	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	84.7	83.0	2.09	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	15.8	16.2	2.19	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.20	<0.20	0.00	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 726282)</b>									
EP1700173-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.11	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.10	0.10	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.35	0.34	2.91	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 728892)</b>									
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
ES1700845-014	SB13_0.5-0.6	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.00	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit		





Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 728892) - continued</b>									
ES1700845-014	SB13_0.5-0.6	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 731237)</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.39	1.33	4.05	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.36	0.38	6.49	0% - 50%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.92	2.00	4.14	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.42	0.44	2.78	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
ES1701175-006	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	9.88	9.54	3.50	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	5.21	5.59	7.04	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	18.2	18.2	0.110	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	2.31	1.75	27.6	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.50	<0.50	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	4.4	5.3	19.0	No Limit		
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 726282)</b>									
EP1700173-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 728892)</b>									
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1700845-014	SB13_0.5-0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 731237)</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701175-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	2.01	2.10	4.38	0% - 50%



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 (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 731237) - continued</b>									
ES1701175-006	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.20	<0.20	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.50	<0.50	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.50	<0.50	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 726282)</b>									
EP1700173-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 728892)</b>									
ES1700845-004	GW04_0.5-0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1700845-014	SB13_0.5-0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 731237)</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 731237) - continued</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701175-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	0.54	0.53	1.87	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	45.9	44.7	2.76	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	8.63	8.27	4.26	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.50	<0.50	0.00	No Limit
<b>EP231P: PFAS Sums (QC Lot: 728892)</b>									
ES1700845-004	GW04_0.5-0.6	EP231X: Sum of PFAS	----	0.01	µg/L	0.49	0.51	4.00	0% - 20%
ES1700845-014	SB13_0.5-0.6	EP231X: Sum of PFAS	----	0.01	µg/L	0.17	0.18	5.71	No Limit
<b>EP231P: PFAS Sums (QC Lot: 731237)</b>									
ES1700845-003	GW03_0.0-0.1	EP231X: Sum of PFAS	----	0.01	µg/L	84.1	84.8	0.782	0% - 20%
ES1701175-006	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	889	915	2.86	0% - 20%



## 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

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 726282)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.2	70	130	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	80.4	70	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	78.8	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	93.2	70	130	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	96.0	70	130	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 728892)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	122	70	130	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	107	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	116	70	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	91.0	70	130	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	120	70	130	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 731237)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	83.6	70	130	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	79.8	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	92.6	70	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	78.6	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	98.4	70	130	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	111	70	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 726282)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	81.0	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	91.2	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	87.8	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	85.8	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	88.6	70	130	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	99.4	70	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	112	70	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	122	70	130	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	79.4	70	130	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	79.5	70	124	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	98.8	70	130	





Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892) - continued</b>									
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	88.6	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	117	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	103	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	111	70	130	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	98.6	70	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	113	70	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	116	70	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	86.6	70	130	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	82.4	70	130	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	113	70	124	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	82.6	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	89.4	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	89.8	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	101	70	130	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	87.8	70	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	110	70	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	102	70	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	92.2	70	130	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	89.6	70	130	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	92.3	70	124	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 726282)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	84.8	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	102	70	129	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	90.4	70	129	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	104	70	126	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	81.6	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	84.4	70	130	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	86.6	70	130	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	116	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	109	70	129	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892) - continued</b>								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	94.2	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	93.5	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	86.0	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	87.4	70	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 731237)</b>								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	104	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	97.4	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	110	70	126
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 726282)</b>								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	89.0	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	88.8	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	92.8	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	88.6	70	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728892)</b>								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	98.2	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	91.4	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	81.2	70	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237)</b>								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	81.8	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	111	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	86.2	70	130

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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
				Low	High		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 726282)</b>							
EP1700173-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	86.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	71.2	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	66.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	75.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	114	50	130
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 728892)</b>							
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	106	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	106	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	114	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	108	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	109	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	108	50	130
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 731237)</b>							
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	80.6	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	77.6	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	99.0	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	119	50	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 726282)</b>							
EP1700173-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	68.4	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	72.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	70.0	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	86.2	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	84.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	82.8	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	121	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	101	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	116	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	69.0	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	73.7	50	130
		<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892)</b>					



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
				Low	High		
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728892) - continued</b>							
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	106	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	113	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	109	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	120	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	109	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	118	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	104	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	121	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	120	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	85.6	50	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	80.2	50	130		
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 731237)</b>							
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	111	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	86.4	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	93.2	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	95.6	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	88.8	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	108	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	111	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	115	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	97.4	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	104	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	98.5	50	130
		<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 726282)</b>					
EP1700173-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	90.6	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	80.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	101	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	91.4	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	107	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	78.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	76.8	50	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892)</b>							
ES1700845-004	GW04_0.5-0.6	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	86.4	50	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728892) - continued</b>							
ES1700845-004	GW04_0.5-0.6	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	110	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	111	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	76.1	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	93.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	83.8	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	105	50	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 731237)</b>							
ES1700845-003	GW03_0.0-0.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	116	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	107	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	107	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	106	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	108	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	112	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	106	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 726282)</b>							
EP1700173-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	75.0	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	89.8	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	118	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	94.8	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728892)</b>							
ES1700845-004	GW04_0.5-0.6	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	111	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	77.4	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	82.0	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237)</b>							
ES1700845-003	GW03_0.0-0.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	99.4	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	95.0	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	116	50	130



Page : 14 of 14  
 Work Order : ES1700845  
 Client : GHD PTY LTD  
 Project : ALBION PARK



Sub-Matrix: **WATER**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 731237) - continued</b>							
ES1700845-003	GW03_0.0-0.1	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	85.2	50	130

ES1629123 LC17

Frank ans 24-1-17 1200

**Frank Ferraro**

**From:** Natalie Emsies  
**Sent:** Tuesday, 24 January 2017 10:40 AM  
**To:** Frank Ferraro  
**Subject:** FW: Full PFAS suite - Lab report ES1629123  
**Attachments:** ES1629123\_0\_COA.pdf; ES1629123\_COC.pdf

Hey Frank,

Can you please arrange this rebatch to have the full suite logged for the samples below....we should still have them.

Kind Regards  
Natalie Emsies

**From:** Nicole Rosen [mailto:Nicole.Rosen@ghd.com]  
**Sent:** Monday, 23 January 2017 6:03 PM  
**To:** Natalie Emsies <Natalie.Emsies@alsglobal.com>  
**Cc:** ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>  
**Subject:** Full PFAS suite - Lab report ES1629123

Hi Natalie,  
 I have just noticed in the following lab report ES1629123 that only had the limited PFAs suite and we needed the full suite.  
 Do you still have the samples? Are we able to schedule them for the full suite?

The following samples required the full PFAs suite.

	Sample Code	ID
1	ES1629123007	SW01
2	ES1629123008	SW02
3	ES1629123009	SW03
4	ES1629123010	SW04
5	ES1629123011	SW05
6	ES1629123012	SWQA1
7	ES1629123013	GW01
8	ES1629123014	GW02
9	ES1629123015	GW03
10	ES1629123016	GW04
11	ES1629123017	GW05
12	ES1629123018	GWQA3

16-12

Environmental Division  
 Sydney  
 Work Order Reference  
**ES1701791**



Telephone : + 61-2-8784 8555

Thanks,

**Nicole Rosen**  
 Senior Environmental Consultant - Contamination Assessment and Remediation

GHD

T: +61 2 9239 7683 | F: 61 2 9239 7199 | V: 217683 | M: 0421 045 835 | E: [nicole.rosen@ghd.com](mailto:nicole.rosen@ghd.com)  
Level 15 133 Castlereagh St Sydney NSW 2000 Australia | <http://www.ghd.com/>  
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**SAMPLE RECEIPT INFORMATION & BOTTLE TYPE**

**WORKORDER NO.:**

**To be completed by Sample Receipt**

<b>Sorting Times</b> <i>(Only record for BP, Mobil &amp; URS)</i>			<b>Temperature Details</b> (Round NOT or COC)		<b>Packaging</b>		<b>Courier Details</b> (Mandatory for Quarantine)		<b>Samples checked, labelled and put in trays by:</b>		<b>Analysis creation by:</b> (Starlins only)	
Time Sorting Commenced:			Sample Temp <b>25.7 °C</b>		Seal Intact - Y / N / NA		Con Note:		Initial:		Initial:	
Time Placed in Fridge:			Chilling Method - Circle <i>If sample temp is less than 6°C it is not necessary to complete this section</i>		Type <b>Esky</b>		No.		<i>Cells shaded grey don't need to be completed on this form if they are entered directly into LIMS/SANGEL by Sample Receipt staff.</i>		Initial:	
Sorting to Fridge Target Time <1 Hour			Ice / Ice Bricks / No Chilling		Other							

**Sample Receipt Advice Comments - To be completed by Sorting Staff**

VOC analysis may be compromised as sample containers contained headspace (litre):

Details of any samples damaged during transit:

Other Information (eg. Were bottles received that weren't completely filled) (eg. If sample temperature is above 6°C add further detail here - *Internal use only - Not for SRN*):

Metals Bottles: F = Field filtered, T = Total, N/S = Not Specified  
 Cyanide Bottles: T = Treated, meaning the client has ticked the pre-treated box on the bottle. Un = Untreated meaning the box is not ticked.  
 Ferrous Iron, Hexavalent Chromium & Geosmin and MIB: F = Field filtered, N/S = Not Specified.  
 Soil Bags: S = Small, M = Medium (~500ml asbestos or PSD bag), L = Large (~6kg FMT bag)

Lab No	Soil	SOL BKG	SV	LC	V	T		W	P	OG	M		MA	IN					Micro		UTW	Cope Lab									
						by	Score				Purple	Beak on White		Red Metal Bottle	Red/Green Metal Bottle	Orange Blue Plastic (OR)	Yellow Plastic (Yellow)	Light Blue Plastic (LBS)	Light Orange Plastic (Light)	Mason Blue Plastic (M)			Brown Green Plastic (Brown)	Stable Micro Jar	Dark Green Plastic (Dark)	Light Green Plastic (Light)	Tartrazine & Fluorescein				
150	Soil Jar	SOIL BKG	SV	LC	V	F	N/S	40	40	40	40	40	40	F	T	N/S	60	F	T	N/S	60	F	T	N/S	100	500	120	200	60	90	10
250	Soil Jar	SOIL BKG	SV	LC	V	F	N/S	40	40	40	40	40	40	F	T	N/S	60	F	T	N/S	60	F	T	N/S	100	500	120	200	60	90	10

This line allows for an initial indication of bottle types received without specifying the exact number for each sample. When using this function tick the boxes matching the containers received for this work order.

## CERTIFICATE OF ANALYSIS

<b>Work Order</b> : <b>ES1701791</b> <b>Client</b> : <b>GHD PTY LTD</b> <b>Contact</b> : <b>JAMES LEAN</b> <b>Address</b> : <b>LEVEL 15, 133 CASTLEREAGH STREET</b> <b>SYDNEY NSW, AUSTRALIA 2000</b>  <b>Telephone</b> : <b>+61 02 9239 7100</b> <b>Project</b> : <b>Albion Park</b> <b>Order number</b> : <b>2125583</b> <b>C-O-C number</b> : <b>----</b> <b>Sampler</b> : <b>JAMES LEAN</b> <b>Site</b> : <b>----</b> <b>Quote number</b> : <b>EN/005/15</b> <b>No. of samples received</b> : <b>12</b> <b>No. of samples analysed</b> : <b>12</b>	<b>Page</b> : 1 of 9 <b>Laboratory</b> : Environmental Division Sydney <b>Contact</b> : Customer Services ES <b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164  <b>Telephone</b> : +61-2-8784 8555 <b>Date Samples Received</b> : 24-Jan-2017 12:00 <b>Date Analysis Commenced</b> : 31-Jan-2017 <b>Issue Date</b> : 02-Feb-2017 12:08
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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>
Alex Rossi	Organic Chemist	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 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.

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.

- EP231: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701791-001	ES1701791-002	ES1701791-003	ES1701791-004	ES1701791-005	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.04	<0.02	0.03	<0.02	3.85	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	<0.02	0.03	<0.02	3.50	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.34	<0.02	0.21	0.05	27.2	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	1.44	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.68	0.08	1.14	0.19	135	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	1.15	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.06	<0.02	0.05	<0.02	4.78	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.08	<0.02	0.05	<0.02	18.5	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.02	<0.02	<0.02	<0.02	2.93	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.03	<0.01	0.04	0.01	9.13	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.13	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.08	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	1.01	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW04	SW05
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701791-001	ES1701791-002	ES1701791-003	ES1701791-004	ES1701791-005	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<b>0.06</b>	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<b>3.64</b>	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<b>0.40</b>	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<b>2.29</b>	<b>0.08</b>	<b>1.55</b>	<b>0.25</b>	<b>213</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<b>2.02</b>	<b>0.08</b>	<b>1.35</b>	<b>0.24</b>	<b>162</b>	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<b>2.25</b>	<b>0.08</b>	<b>1.52</b>	<b>0.25</b>	<b>205</b>	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	<b>101</b>	<b>106</b>	<b>113</b>	<b>105</b>	<b>99.8</b>	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701791-006	ES1701791-007	ES1701791-008	ES1701791-009	ES1701791-010	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	3.77	<0.10	<0.10	12.8	<0.10	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	3.46	<0.10	<0.10	9.22	<0.10	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	26.2	0.22	<0.10	38.2	<0.10	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.48	<0.10	<0.10	1.14	<0.10	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	133	0.23	0.20	8.26	0.20	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	1.13	<0.10	<0.10	<0.10	<0.10	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.5	<0.5	<0.5	<0.5	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	4.69	<0.10	<0.10	2.96	<0.10	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	18.3	0.12	<0.10	14.8	<0.10	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	2.87	<0.10	<0.10	3.01	<0.10	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	8.55	<0.05	<0.05	2.57	<0.05	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.10	<0.10	<0.10	<0.10	<0.10	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	0.08	<0.10	<0.10	<0.10	<0.10	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.10	<0.10	<0.10	<0.10	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.10	<0.10	<0.10	<0.10	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.10	<0.10	<0.10	<0.10	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	1.05	<0.10	<0.10	<0.10	<0.10	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SWQA1	GW01	GW02	GW03	GW04
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	16-Dec-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701791-006	ES1701791-007	ES1701791-008	ES1701791-009	ES1701791-010	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<b>0.08</b>	<0.10	<0.10	<0.10	<0.10	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.10	<0.10	<0.10	<0.10	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<b>3.33</b>	<0.25	<0.25	<0.25	<0.25	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<b>0.42</b>	<0.25	<0.25	<0.25	<0.25	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.25	<0.25	<0.25	<0.25	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<b>208</b>	<b>0.57</b>	<b>0.20</b>	<b>93.0</b>	<b>0.20</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<b>159</b>	<b>0.45</b>	<b>0.20</b>	<b>46.5</b>	<b>0.20</b>	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<b>201</b>	<b>0.57</b>	<b>0.20</b>	<b>82.6</b>	<b>0.20</b>	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	<b>101</b>	<b>114</b>	<b>110</b>	<b>106</b>	<b>105</b>	





## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID			GW05	GWQA3	----	----	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	----	----	----	----	----	
Compound	CAS Number	LOR	Unit	ES1701791-011	ES1701791-012	-----	-----	-----	-----	-----	
				Result	Result	----	----	----	----	----	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>											
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.12	<0.10	----	----	----	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.10	0.34	----	----	----	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.10	0.23	----	----	----	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>											
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.5	<0.5	----	----	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.10	0.14	----	----	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.05	<0.05	----	----	----	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.25	<0.25	----	----	----	----	----	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>											
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.10	<0.10	----	----	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.25	<0.25	----	----	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.25	<0.25	----	----	----	----	----	



## Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	GW05	GWQA3	----	----	----
Client sampling date / time				16-Dec-2016 00:00	16-Dec-2016 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	ES1701791-011	ES1701791-012	-----	-----	-----	
				Result	Result	----	----	----	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.25	<0.25	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.25	<0.25	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.10	<0.10	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.10	<0.10	----	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.25	<0.25	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.25	<0.25	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.25	<0.25	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.25	<0.25	----	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<b>0.22</b>	<b>0.71</b>	----	----	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<b>0.10</b>	<b>0.57</b>	----	----	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<b>0.22</b>	<b>0.71</b>	----	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	<b>105</b>	<b>111</b>	----	----	----	



### Surrogate Control Limits

Sub-Matrix: <b>WATER</b>		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP231S: PFAS Surrogate</b>			
<b>13C4-PFOS</b>	----	60	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1701791	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: JAMES LEAN	Telephone	: +61-2-8784 8555
Project	: Albion Park	Date Samples Received	: 24-Jan-2017
Site	: ----	Issue Date	: 02-Feb-2017
Sampler	: JAMES LEAN	No. of samples received	: 12
Order number	: 2125583	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.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

#### Outliers : Analysis Holding Time Compliance

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

#### Outliers : Frequency of Quality Control Samples

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



## Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
<b>HDPE Soil Jar (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	31-Jan-2017	14-Jun-2017	✓
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>							
<b>HDPE Soil Jar (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	31-Jan-2017	14-Jun-2017	✓
<b>EP231C: Perfluoroalkyl Sulfonamides</b>							
<b>HDPE Soil Jar (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	31-Jan-2017	14-Jun-2017	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>							
<b>HDPE Soil Jar (EP231X)</b> SW01, SW03, SW05, GW01, GW03, GW05, SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	31-Jan-2017	14-Jun-2017	✓





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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP231P: PFAS Sums</b>								
<b>HDPE Soil Jar (EP231X)</b>								
SW01, SW03, SW05, GW01, GW03, GW05,	SW02, SW04, SWQA1, GW02, GW04, GWQA3	16-Dec-2016	----	----	----	31-Jan-2017	14-Jun-2017	✓



## 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	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	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
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1701791</b>	<b>Page</b>	: 1 of 7
<b>Client</b>	: <b>GHD PTY LTD</b>	<b>Laboratory</b>	: Environmental Division Sydney
<b>Contact</b>	: JAMES LEAN	<b>Contact</b>	: Customer Services ES
<b>Address</b>	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	<b>Address</b>	: 277-289 Woodpark Road Smithfield NSW Australia 2164
<b>Telephone</b>	: +61 02 9239 7100	<b>Telephone</b>	: +61-2-8784 8555
<b>Project</b>	: Albion Park	<b>Date Samples Received</b>	: 24-Jan-2017
<b>Order number</b>	: 2125583	<b>Date Analysis Commenced</b>	: 31-Jan-2017
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 02-Feb-2017
<b>Sampler</b>	: JAMES LEAN		
<b>Site</b>	: ----		
<b>Quote number</b>	: EN/005/15		
<b>No. of samples received</b>	: 12		
<b>No. of samples analysed</b>	: 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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW



## General Comments

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

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

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

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 735757)</b>											
ES1701714-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.04	0.00	No Limit		
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.02	0.02	0.00	No Limit		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
ES1701791-003	SW03	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.14	1.14	0.00	0% - 20%		
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.00	No Limit		
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.03	0.02	0.00	No Limit		
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.21	0.22	0.00	0% - 50%		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 735757)</b>											
ES1701714-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.00	No Limit		
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
		ES1701791-003	SW03	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.04	0.04	0.00	No Limit





Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 735757) - continued</b>									
ES1701791-003	SW03	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.05	0.05	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit		
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 735757)</b>									
ES1701714-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701791-003	SW03	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 735757)</b>									
ES1701714-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 735757) - continued</b>									
ES1701714-001	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
ES1701791-003	SW03	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231P: PFAS Sums (QC Lot: 735757)</b>									
ES1701714-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.07	0.08	13.3	No Limit
ES1701791-003	SW03	EP231X: Sum of PFAS	----	0.01	µg/L	1.55	1.55	0.00	0% - 20%



## 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**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 735757)</b>									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	109	70	130	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	112	70	130	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	113	70	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	108	70	130	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	123	70	130	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	109	70	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 735757)</b>									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	83.0	70	130	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	93.4	70	130	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	114	70	130	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	111	70	130	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	111	70	130	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	117	70	130	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	96.4	70	130	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	109	70	130	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	111	70	130	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	120	70	130	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	109	70	124	
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 735757)</b>									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	110	70	130	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	117	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	114	70	129	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	96.0	70	129	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	103	70	126	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	106	70	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	111	70	130	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 735757)</b>									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	113	70	130	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	93.2	70	130	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	113	70	130	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 735757) - continued</b>								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	117	70	130

### 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

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%) Low High	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 735757)</b>							
ES1701714-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	110	50	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	114	50	130
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	94.2	50	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	98.6	50	130
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	99.8	50	130
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	102	50	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 735757)</b>							
ES1701714-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	77.5	50	130
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	86.6	50	130
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	109	50	130
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	111	50	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	89.2	50	130
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	85.6	50	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	94.2	50	130
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	119	50	130
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	108	50	130
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	110	50	130
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	103	50	130
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 735757)</b>							
ES1701714-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	109	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	98.2	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	99.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	97.3	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	106	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	112	50	130

Page : 7 of 7  
 Work Order : ES1701791  
 Client : GHD PTY LTD  
 Project : Albion Park



Sub-Matrix: **WATER**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 735757) - continued</b>							
ES1701714-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	104	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 735757)</b>							
ES1701714-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	110	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	103	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	111	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	115	50	130



19/01/17 14:00  
J. Grealy

**Jessie Grealy**

---

**From:** Natalie Emsies  
**Sent:** Thursday, 19 January 2017 2:11 PM  
**To:** Samples Sydney; Jessie Grealy; Frank Ferraro; ALS Enviro Melbourne  
**Cc:** ALSEnviro Sydney  
**Subject:** FW: Additional analysis required - TCLP

Hi All,

Can you please arrange the highlighted rebatch requested below?

Kind Regards  
Natalie Emsies

TAT

**From:** Nicole Rosen [mailto:Nicole.Rosen@ghd.com]  
**Sent:** Thursday, 19 January 2017 12:06 PM  
**To:** Natalie Emsies  
**Cc:** ALSEnviro Sydney  
**Subject:** FW: Additional analysis required - TCLP

Hi Natalie,

I also sent this email yesterday to Sepan and haven't had a response. Are you able to schedule these for me?  
Are you able to let me know what is the best email to use for these request?

Thanks  
Nicole

**From:** Nicole Rosen  
**Sent:** Wednesday, 18 January 2017 2:41 PM  
**To:** Sepan Mahamad <Sepan.Mahamad@alsglobal.com>  
**Cc:** 'ALSEnviro.Sydney@alsglobal.com' <ALSEnviro.Sydney@alsglobal.com>  
**Subject:** Additional analysis required - TCLP

Hi Sepan,

Apologies for this but just realised that the four sites we need some TCLP analysis as well for the full suite PFAS.  
Can they please be on 48 hour TAT.

**Greenacre – 21/25583/06**  
ES1629370001 – MW02\_1.0-1.1  
ES1629370004 – MW01\_5.9-6.0

**Deniliquin - 21/25583/05**  
EM1614608035 – MW01\_0.1  
EM1614608037 - MW01\_9.0

**Armidale - 21/25583/04**  
ES1627710001 – MW1\_0.5-0.6  
ES1627710013 – MW04\_1.9-2.0

**Albion Park – 21/25583/02**  
ES1628401017 – GW03\_0.0-0.1

Environmental Division  
Sydney  
Work Order Reference  
**ES1701294**



Telephone : + 61-2-8794 8555

ES1628401026 – GW02\_0.5-0.6

Thanks,

**Nicole Rosen**  
**Senior Environmental Consultant - Contamination Assessment and Remediation**

**GHD**

T: +61 2 9239 7683 | F: 61 2 9239 7199 | V: 217683 | M: 0421 045 835 | E: [nicole.rosen@ghd.com](mailto:nicole.rosen@ghd.com)  
Level 15 133 Castlereagh St Sydney NSW 2000 Australia | <http://www.ghd.com/>  
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## CERTIFICATE OF ANALYSIS

<b>Work Order</b> : <b>ES1701294</b> <b>Client</b> : <b>GHD PTY LTD</b> <b>Contact</b> : <b>MS NICOLE ROSEN</b> <b>Address</b> : <b>LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000</b>  <b>Telephone</b> : <b>+61 02 9239 7100</b> <b>Project</b> : <b>----</b> <b>Order number</b> : <b>----</b> <b>C-O-C number</b> : <b>----</b> <b>Sampler</b> : <b>----</b> <b>Site</b> : <b>----</b> <b>Quote number</b> : <b>EN/005/15</b> <b>No. of samples received</b> : <b>8</b> <b>No. of samples analysed</b> : <b>8</b>	<b>Page</b> : 1 of 9 <b>Laboratory</b> : Environmental Division Sydney <b>Contact</b> : Customer Services ES <b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164  <b>Telephone</b> : +61-2-8784 8555 <b>Date Samples Received</b> : 19-Jan-2017 14:00 <b>Date Analysis Commenced</b> : 20-Jan-2017 <b>Issue Date</b> : 24-Jan-2017 14:07
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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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



## General Comments

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

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

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

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

When 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.

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

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



**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MW02_1.0-1.1	MW01_5.9-6.0	MW01_0.1	MW01_9.0	MW1_0.5-0.6
Client sampling date / time				19-Dec-2016 00:00	19-Dec-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	29-Nov-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701294-001	ES1701294-002	ES1701294-003	ES1701294-004	ES1701294-005	
				Result	Result	Result	Result	Result	
<b>EN33: TCLP Leach</b>									
Initial pH	----	0.1	pH Unit	5.2	9.5	8.4	9.3	7.2	
After HCl pH	----	0.1	pH Unit	1.7	1.9	1.8	1.8	1.7	
Extraction Fluid Number	----	1	-	1	1	1	1	1	
Final pH	----	0.1	pH Unit	4.4	5.6	4.9	5.1	4.9	





**Analytical Results**

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MW04_1.9-2.0	GW03_0.0-0.1	GW02_0.5-0.6	----	----
Client sampling date / time			01-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1701294-006	ES1701294-007	ES1701294-008	-----	-----
				Result	Result	Result	----	----
<b>EN33: TCLP Leach</b>								
Initial pH	----	0.1	pH Unit	7.3	6.3	5.1	----	----
After HCl pH	----	0.1	pH Unit	1.8	1.8	1.8	----	----
Extraction Fluid Number	----	1	-	1	1	1	----	----
Final pH	----	0.1	pH Unit	4.9	4.9	4.9	----	----



## Analytical Results

Sub-Matrix: TREATED LEACHATE (Matrix: WATER)				Client sample ID	MW02_1.0-1.1	MW01_5.9-6.0	MW01_0.1	MW01_9.0	MW1_0.5-0.6
Client sampling date / time				19-Dec-2016 00:00	19-Dec-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	29-Nov-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701294-001	ES1701294-002	ES1701294-003	ES1701294-004	ES1701294-005	
				Result	Result	Result	Result	Result	
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.22	0.07	0.56	0.16	0.03	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.04	0.37	0.08	0.03	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.63	0.36	4.72	0.25	0.37	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.30	<0.02	1.73	0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.02	0.04	106	1.83	0.22	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.06	0.03	0.45	0.11	0.03	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	0.12	1.62	0.25	0.06	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	<0.02	0.13	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.11	0.02	0.90	0.02	0.02	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.11	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.08	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231C: Perfluoroalkyl Sulfonamides</b>									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



## Analytical Results

Sub-Matrix: TREATED LEACHATE (Matrix: WATER)				Client sample ID	MW02_1.0-1.1	MW01_5.9-6.0	MW01_0.1	MW01_9.0	MW1_0.5-0.6
Client sampling date / time				19-Dec-2016 00:00	19-Dec-2016 00:00	30-Nov-2016 00:00	30-Nov-2016 00:00	29-Nov-2016 00:00	
Compound	CAS Number	LOR	Unit	ES1701294-001	ES1701294-002	ES1701294-003	ES1701294-004	ES1701294-005	
				Result	Result	Result	Result	Result	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<b>0.97</b>	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<b>0.33</b>	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<b>8.75</b>	<b>0.68</b>	<b>118</b>	<b>2.72</b>	<b>0.76</b>	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<b>7.65</b>	<b>0.40</b>	<b>111</b>	<b>2.08</b>	<b>0.59</b>	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<b>8.29</b>	<b>0.64</b>	<b>116</b>	<b>2.62</b>	<b>0.73</b>	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	<b>105</b>	<b>113</b>	<b>99.1</b>	<b>98.9</b>	<b>104</b>	



## Analytical Results

Sub-Matrix: TREATED LEACHATE  
 (Matrix: WATER)

Client sample ID

				MW04_1.9-2.0	GW03_0.0-0.1	GW02_0.5-0.6	----	----
Client sampling date / time				01-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1701294-006	ES1701294-007	ES1701294-008	-----	-----
				Result	Result	Result	----	----
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.94	0.14	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.95	0.11	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	0.11	10.2	2.21	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	1.28	0.08	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.29	34.7	1.74	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.42	0.05	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	1.89	0.20	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.26	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.92	0.04	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



## Analytical Results

Sub-Matrix: TREATED LEACHATE (Matrix: WATER)				Client sample ID	MW04_1.9-2.0	GW03_0.0-0.1	GW02_0.5-0.6	----	----
Client sampling date / time				01-Dec-2016 00:00	07-Dec-2016 00:00	06-Dec-2016 00:00	----	----	
Compound	CAS Number	LOR	Unit	ES1701294-006	ES1701294-007	ES1701294-008	-----	-----	
				Result	Result	Result	----	----	
<b>EP231C: Perfluoroalkyl Sulfonamides - Continued</b>									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----	
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----	
<b>EP231P: PFAS Sums</b>									
Sum of PFAS	----	0.01	µg/L	<b>0.40</b>	<b>51.6</b>	<b>4.57</b>	----	----	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<b>0.40</b>	<b>44.9</b>	<b>3.95</b>	----	----	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<b>0.40</b>	<b>49.3</b>	<b>4.38</b>	----	----	
<b>EP231S: PFAS Surrogate</b>									
13C4-PFOS	----	0.02	%	<b>110</b>	<b>107</b>	<b>103</b>	----	----	





### Surrogate Control Limits

Sub-Matrix: TREATED LEACHATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP231S: PFAS Surrogate</b>			
13C4-PFOS	----	60	130

## QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1701294	Page	: 1 of 5
Client	: GHD PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 19-Jan-2017
Site	: ----	Issue Date	: 24-Jan-2017
Sampler	: ----	No. of samples received	: 8
Order number	: ----	No. of samples analysed	: 8

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

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

### Summary of Outliers

#### Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

#### Outliers : Analysis Holding Time Compliance

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

#### Outliers : Frequency of Quality Control Samples

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



### Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
<b>Matrix Spike (MS) Recoveries</b>							
EP231A: Perfluoroalkyl Sulfonic Acids	ES1701294--001	MW02_1.0-1.1	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

### Analysis Holding Time Compliance

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

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

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

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

Matrix: **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
<b>EN33: TCLP Leach</b>							
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) MW04_1.9-2.0	01-Dec-2016	20-Jan-2017	30-May-2017	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) GW02_0.5-0.6	06-Dec-2016	20-Jan-2017	04-Jun-2017	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) GW03_0.0-0.1	07-Dec-2016	20-Jan-2017	05-Jun-2017	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) MW02_1.0-1.1, MW01_5.9-6.0	19-Dec-2016	20-Jan-2017	17-Jun-2017	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) MW1_0.5-0.6	29-Nov-2016	20-Jan-2017	28-May-2017	✓	----	----	----
Non-Volatile Leach: 180 day HT (e.g. metals ex.Hg) (EN33a) MW01_0.1, MW01_9.0	30-Nov-2016	20-Jan-2017	29-May-2017	✓	----	----	----

Matrix: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
<b>EP231A: Perfluoroalkyl Sulfonic Acids</b>							
HDPE (no PTFE) (EP231X) MW02_1.0-1.1, MW01_0.1, MW1_0.5-0.6, GW03_0.0-0.1, MW01_5.9-6.0, MW01_9.0, MW04_1.9-2.0, GW02_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓



Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
<b>EP231B: Perfluoroalkyl Carboxylic Acids</b>								
<b>HDPE (no PTFE) (EP231X)</b> MW02_1.0-1.1, MW01_0.1, MW1_0.5-0.6, GW03_0.0-0.1,	MW01_5.9-6.0, MW01_9.0, MW04_1.9-2.0, GW02_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>EP231C: Perfluoroalkyl Sulfonamides</b>								
<b>HDPE (no PTFE) (EP231X)</b> MW02_1.0-1.1, MW01_0.1, MW1_0.5-0.6, GW03_0.0-0.1,	MW01_5.9-6.0, MW01_9.0, MW04_1.9-2.0, GW02_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids</b>								
<b>HDPE (no PTFE) (EP231X)</b> MW02_1.0-1.1, MW01_0.1, MW1_0.5-0.6, GW03_0.0-0.1,	MW01_5.9-6.0, MW01_9.0, MW04_1.9-2.0, GW02_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓
<b>EP231P: PFAS Sums</b>								
<b>HDPE (no PTFE) (EP231X)</b> MW02_1.0-1.1, MW01_0.1, MW1_0.5-0.6, GW03_0.0-0.1,	MW01_5.9-6.0, MW01_9.0, MW04_1.9-2.0, GW02_0.5-0.6	20-Jan-2017	----	----	----	23-Jan-2017	19-Jul-2017	✓



## Quality Control Parameter Frequency Compliance

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

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<i>Analytical Methods</i>							
<b>Method Blanks (MB)</b>							
TCLP for Non & Semivolatile Analytes	EN33a	1	8	12.50	9.09	✔	NEPM 2013 B3 & ALS QC Standard

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
<i>Analytical Methods</i>							
<b>Laboratory Duplicates (DUP)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	8	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Laboratory Control Samples (LCS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Method Blanks (MB)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
<b>Matrix Spikes (MS)</b>							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	8	12.50	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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In house: Direct injection analysis of fresh waters after dilution (1:1) with methanol. Analysis by LC-Electrospray-MS-MS, Negative Mode using MRM. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers.

<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>ES1701294</b>	Page	: 1 of 6
Client	: <b>GHD PTY LTD</b>	Laboratory	: Environmental Division Sydney
Contact	: MS NICOLE ROSEN	Contact	: Customer Services ES
Address	: LEVEL 15, 133 CASTLEREAGH STREET SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 9239 7100	Telephone	: +61-2-8784 8555
Project	: ----	Date Samples Received	: 19-Jan-2017
Order number	: ----	Date Analysis Commenced	: 20-Jan-2017
C-O-C number	: ----	Issue Date	: 24-Jan-2017
Sampler	: ----		
Site	: ----		
Quote number	: EN/005/15		
No. of samples received	: 8		
No. of samples analysed	: 8		



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>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



## General Comments

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

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

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

Key :  
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot  
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.  
 LOR = Limit of reporting  
 RPD = Relative Percentage Difference  
 # = Indicates failed QC

## Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 728894)</b>									
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	6.02	5.48	9.49	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.22	0.20	5.69	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.17	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	1.63	1.65	1.10	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.30	0.32	5.49	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.00	No Limit
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 728894)</b>									
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.11	0.10	0.00	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.06	0.06	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.22	0.21	0.00	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.03	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.00	No Limit
		<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 728894)</b>							
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<b>EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 728894) - continued</b>									
ES1701294-001	MW02_1.0-1.1	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 728894)</b>									
ES1701294-001	MW02_1.0-1.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.00	No Limit
<b>EP231P: PFAS Sums (QC Lot: 728894)</b>									
ES1701294-001	MW02_1.0-1.1	EP231X: Sum of PFAS	----	0.01	µg/L	8.75	8.22	6.25	0% - 20%



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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
<b>EN33: TCLP Leach (QCLot: 727403)</b>								
EN33a: Initial pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	1.0	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	1.0	----	----	----	----

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					LCS	Low	High	
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 728894)</b>								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.5 µg/L	122	70	130
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.02	µg/L	<0.02	0.5 µg/L	113	70	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.5 µg/L	115	70	130
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.5 µg/L	107	70	130
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.5 µg/L	112	70	130
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728894)</b>								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	2.5 µg/L	102	70	130
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.5 µg/L	102	70	130
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.5 µg/L	110	70	130
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.5 µg/L	122	70	130
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.5 µg/L	116	70	130
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.5 µg/L	107	70	130
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.5 µg/L	114	70	130
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.5 µg/L	105	70	130
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	1.25 µg/L	82.2	70	124
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728894)</b>								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.5 µg/L	108	70	130
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	1.25 µg/L	109	70	130
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	1.25 µg/L	101	70	129
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	0.05	µg/L	<0.05	1.25 µg/L	89.8	70	129
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	1.25 µg/L	91.4	70	126



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728894) - continued</b>								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.5 µg/L	92.2	70	130
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.5 µg/L	106	70	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728894)</b>								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.5 µg/L	104	70	130
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.5 µg/L	117	70	130
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.5 µg/L	103	70	130
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.5 µg/L	110	70	130

**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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery (%) MS	Recovery Limits (%)		
							Low	High
<b>EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 728894)</b>								
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5 µg/L	97.0	50	130	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.5 µg/L	112	50	130	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.5 µg/L	80.6	50	130	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.5 µg/L	97.2	50	130	
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.5 µg/L	# Not Determined	50	130	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.5 µg/L	114	50	130	
<b>EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 728894)</b>								
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	2.5 µg/L	98.7	50	130	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.5 µg/L	107	50	130	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.5 µg/L	119	50	130	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.5 µg/L	104	50	130	
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.5 µg/L	114	50	130	
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.5 µg/L	108	50	130	
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.5 µg/L	110	50	130	
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.5 µg/L	98.2	50	130	
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.5 µg/L	98.2	50	130	
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.5 µg/L	90.8	50	130	
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	1.25 µg/L	73.4	50	130	
		<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728894)</b>						





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
<b>EP231C: Perfluoroalkyl Sulfonamides (QCLot: 728894) - continued</b>							
ES1701294-001	MW02_1.0-1.1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.5 µg/L	94.2	50	130
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	1.25 µg/L	106	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	1.25 µg/L	110	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7	1.25 µg/L	74.1	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	1.25 µg/L	91.8	50	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.5 µg/L	83.6	50	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.5 µg/L	91.8	50	130
<b>EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 728894)</b>							
ES1701294-001	MW02_1.0-1.1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.5 µg/L	119	50	130
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.5 µg/L	107	50	130
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.5 µg/L	78.0	50	130
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.5 µg/L	103	50	130



**CHAIN OF CUSTODY**

ALS Laboratory:  
please tick →

ADLADE 21 Burma Road Pootara SA 5005  
Ph 08 8350 0890 E: adelaide@alsglobal.com

BRISBANE 32 Shand Street Stafford QLD 4053  
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GLADSTONE 46 Callmondah Drive Clinton QLD 4680  
Ph 07 7471 5000 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740  
Ph 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171  
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Ph 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818  
Ph 07 4766 0800 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500  
Ph 02 4225 3125 E: portkemps@alsglobal.com

CLIENT: GHD Pty Ltd

OFFICE: SYDNEY (CASTLEREAGH ST)

PROJECT: ALBION PARK

ORDER NUMBER: 21-25583/02

PROJECT MANAGER: BEN ANDERSON

SAMPLER: Matthew West

COC emailed to ALS? ( YES / NO)

Email Reports to: Ben.Anderson@ghd.com; Matthew West@ghd.com and Melissa.Weber@ghd.com

Email Invoice to (will default to PM if no other addresses are listed): Ben.Anderson@ghd.com and

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS :  Standard TAT (List due date):

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

Non Standard or urgent TAT (List due date):

ALS QUOTE NO: EN005/16

COC SEQUENCE NUMBER (Circle)							
COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

CONTACT PH: 0408 713 343

SAMPLER MOBILE: 0408 650 579

EDD FORMAT (or default): ESDAT

RELINQUISHED BY:

MATTHEW WEST

DATE/TIME: 2:30PM

08/12/2011

RECEIVED BY:

Frank me

DATE/TIME: 9-11-16 0830

RELINQUISHED BY:

DATE/TIME:

RECEIVED BY:

Eileen

DATE/TIME: 6/2/2016 1455

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below	(refer to	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information	
							PFAS (LIMITED SUITE)	TRH	BTEX	PAH's	TOC	CEC	PH	METALS (8)		
109	SB15_3.0_3.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED		1										
110	SB15_4.0_4.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED		1										
111	SB15_5.0_5.1	8-Dec	S	GLASS JAR + TEFLON LID REMOVED		1	X									
112	SB15_5.5_5.6	8-Dec	S	GLASS JAR + TEFLON LID REMOVED		1										
113	BD1_051216	5-Dec	S	PLASTIC JAR + GLASS JAR		2		X	X	X					X	
114	BD2_061216	6-Dec	S	PLASTIC JAR + GLASS JAR		2										
115	BD3_071216	7-Dec	S	PLASTIC JAR + GLASS JAR		2	X	X	X	X					X	PLEASE FORWARD TO EUROFINS AS BLIND DUP
116	BD4_081216	8-Dec	S	PLASTIC JAR + GLASS JAR		2										
117	RB_051216	8-Dec	W	2 VIAL, 1 METALS BOTTLE		3	X	X	X							
118	RB_061216	8-Dec	W	2 VIAL, 1 METALS BOTTLE		3		X	X							
119	RB_071216	8-Dec	W	2 VIAL, 1 METALS BOTTLE, 1 500mL		4	X	X	X							
120	RB_081216	8-Dec	W	2 VIAL, 1 METALS BOTTLE, 1 500mL		4		X	X							
TOTAL:																527586

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic  
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;  
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solts; B = Unpreserved Bag.

## Sample Receipt Advice

Company name: **GHD Pty Ltd NSW**  
Contact name: **Ben Anderson**  
Project name: **ALBION PARK**  
Project ID: **21-25583/02**  
COC number: **Not provided**  
Turn around time: **5 Day**  
Date/Time received: **Dec 12, 2016 2:55 PM**  
Eurofins | mgt reference: **527586**

### Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
  - Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 13.5 degrees Celsius.
  - All samples have been received as described on the above COC.
  - COC has been completed correctly.
  - Attempt to chill was evident.
  - Appropriately preserved sample containers have been used.
  - All samples were received in good condition.
  - Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
  - Appropriate sample containers have been used.
  - Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

### Notes

PFAS analysis conducted

### Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Ben Anderson - ben.anderson@ghd.com.

GHD Pty Ltd NSW  
 Level 15, 133 Castlereagh Street  
 Sydney  
 NSW 2000



NATA Accredited  
 Accreditation Number 1261  
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
 The results of the tests, calibrations and/or  
 measurements included in this document are traceable  
 to Australian/national standards.

Attention: Ben Anderson

Report 527586-S  
 Project name ALBION PARK  
 Project ID 21-25583/02  
 Received Date Dec 12, 2016

Client Sample ID			BD3_071216
Sample Matrix			Soil
Eurofins   mgt Sample No.			S16-De13878
Date Sampled			Dec 07, 2016
Test/Reference	LOR	Unit	
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-36 (Total)	50	mg/kg	< 50
<b>BTEX</b>			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	53
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			
Naphthalene <sup>N02</sup>	0.5	mg/kg	< 0.5
TRH >C10-C16 less Naphthalene (F2) <sup>N01</sup>	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1) <sup>N04</sup>	20	mg/kg	< 20
<b>Polycyclic Aromatic Hydrocarbons</b>			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene <sup>N07</sup>	0.5	mg/kg	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5

<b>Client Sample ID</b>			<b>BD3_071216</b>
<b>Sample Matrix</b>			<b>Soil</b>
<b>Eurofins   mgt Sample No.</b>			<b>S16-De13878</b>
<b>Date Sampled</b>			<b>Dec 07, 2016</b>
Test/Reference	LOR	Unit	
<b>Polycyclic Aromatic Hydrocarbons</b>			
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	86
p-Terphenyl-d14 (surr.)	1	%	93
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>			
TRH >C10-C16	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
<b>Per- and Polyfluorinated Alkyl Substances (PFASs)</b>			
Perfluorobutanesulfonic acid (PFBS)	0.005	mg/kg	< 0.005
Perfluorobutanoic acid (PFBA)	0.005	mg/kg	0.006
Perfluorohexanesulfonic acid (PFHxS)	0.005	mg/kg	<sup>N09</sup> 0.007
Perfluorooctanesulfonic acid (PFOS)	0.005	mg/kg	<sup>N09</sup> 0.009
Perfluorodecanesulfonic acid (PFDS)	0.005	mg/kg	< 0.005
Perfluoropentanoic acid (PFPeA)	0.005	mg/kg	< 0.005
Perfluorohexanoic acid (PFHxA)	0.005	mg/kg	<sup>N09</sup> 0.008
Perfluoroheptanoic acid (PFHpA)	0.005	mg/kg	< 0.005
Perfluorooctanoic acid (PFOA)	0.005	mg/kg	< 0.005
Perfluorononanoic acid (PFNA)	0.005	mg/kg	< 0.005
Perfluorodecanoic acid (PFDA)	0.005	mg/kg	< 0.005
Perfluoroundecanoic acid (PFUnA)	0.005	mg/kg	< 0.005
Perfluorododecanoic acid (PFDoA)	0.005	mg/kg	< 0.005
Perfluorotridecanoic acid (PFTrDA)	0.005	mg/kg	< 0.005
Perfluorotetradecanoic acid (PFTeDA)	0.005	mg/kg	< 0.005
Perfluorooctanesulfonamide (PFOSA)	0.01	mg/kg	< 0.01
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.01	mg/kg	< 0.01
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	0.005	mg/kg	< 0.005
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	0.01	mg/kg	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	0.005	mg/kg	< 0.005
d5-n-EtFOSAA (surr.)	1	%	92
13C-PFHxA (surr.)	1	%	87
13C8-PFOS (surr.)	1	%	99
<b>Heavy Metals</b>			
Arsenic	2	mg/kg	< 2
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	22
Copper	5	mg/kg	15
Lead	5	mg/kg	18
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	5.2
Zinc	5	mg/kg	14
<b>% Moisture</b>			
	1	%	16

### Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: TRH C6-C36 - LTM-ORG-2010	Sydney	Dec 16, 2016	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 16, 2016	14 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 16, 2016	14 Day
BTEX - Method: TRH C6-C40 - LTM-ORG-2010	Sydney	Dec 16, 2016	14 Day
Polycyclic Aromatic Hydrocarbons - Method: E007 Polyaromatic Hydrocarbons (PAH)	Sydney	Dec 16, 2016	14 Day
Per- and Polyfluorinated Alkyl Substances (PFASs) - Method: LTM-ORG-2100 Per- and Polyfluorinated Alkyl Substances by LC-MS/MS	Brisbane	Dec 13, 2016	180 Day
Metals M8 - Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS	Sydney	Dec 16, 2016	28 Day
% Moisture - Method: LTM-GEN-7080 Moisture	Sydney	Dec 13, 2016	14 Day



<b>Company Name:</b> GHD Pty Ltd NSW <b>Address:</b> Level 15, 133 Castlereagh Street Sydney NSW 2000  <b>Project Name:</b> ALBION PARK <b>Project ID:</b> 21-25583/02	<b>Order No.:</b> <b>Report #:</b> 527586 <b>Phone:</b> 02 9239 7100 <b>Fax:</b> 02 9239 7199	<b>Received:</b> Dec 12, 2016 2:55 PM <b>Due:</b> Dec 19, 2016 <b>Priority:</b> 5 Day <b>Contact Name:</b> Ben Anderson
<b>Eurofins   mgt Analytical Services Manager : Nibha Vaidya</b>		

Sample Detail						Polycyclic Aromatic Hydrocarbons	Metals M8	BTEX	Per- and Polyfluorinated Alkyl Substances (PFASs)	Moisture Set	Total Recoverable Hydrocarbons
<b>Melbourne Laboratory - NATA Site # 1254 &amp; 14271</b>											
<b>Sydney Laboratory - NATA Site # 18217</b>						X	X	X		X	X
<b>Brisbane Laboratory - NATA Site # 20794</b>									X		
<b>Perth Laboratory - NATA Site # 18217</b>											
<b>External Laboratory</b>											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	BD3_071216	Dec 07, 2016		Soil	S16-De13878	X	X	X	X	X	X
<b>Test Counts</b>						1	1	1	1	1	1

## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per Kilogram

**mg/l:** milligrams per litre

**ug/l:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100ml:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery
<b>CRM</b>	Certified Reference Material - reported as percent recovery
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>Batch Duplicate</b>	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
<b>Batch SPIKE</b>	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs 20-130%

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
<b>Method Blank</b>							
<b>BTEX</b>							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
<b>Method Blank</b>							
<b>Polycyclic Aromatic Hydrocarbons</b>							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
<b>Method Blank</b>							
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
<b>Method Blank</b>							
<b>Per- and Polyfluorinated Alkyl Substances (PFASs)</b>							
Perfluorobutanesulfonic acid (PFBS)	mg/kg	< 0.005			0.005	Pass	
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanesulfonic acid (PFOS)	mg/kg	< 0.005			0.005	Pass	
Perfluorodecanesulfonic acid (PFDS)	mg/kg	< 0.005			0.005	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.005			0.005	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.005			0.005	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.005			0.005	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.005			0.005	Pass	

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Perfluorononanoic acid (PFNA)	mg/kg	< 0.005		0.005	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.005		0.005	Pass	
Perfluoroundecanoic acid (PFUnA)	mg/kg	< 0.005		0.005	Pass	
Perfluorododecanoic acid (PFDoA)	mg/kg	< 0.005		0.005	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.005		0.005	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.005		0.005	Pass	
Perfluorooctanesulfonamide (PFOSA)	mg/kg	< 0.01		0.01	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	mg/kg	< 0.01		0.01	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	mg/kg	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	mg/kg	< 0.005		0.005	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	mg/kg	< 0.01		0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	mg/kg	< 0.005		0.005	Pass	
<b>Method Blank</b>						
<b>Heavy Metals</b>						
Arsenic	mg/kg	< 2		2	Pass	
Cadmium	mg/kg	< 0.4		0.4	Pass	
Chromium	mg/kg	< 5		5	Pass	
Copper	mg/kg	< 5		5	Pass	
Lead	mg/kg	< 5		5	Pass	
Mercury	mg/kg	< 0.1		0.1	Pass	
Nickel	mg/kg	< 5		5	Pass	
Zinc	mg/kg	< 5		5	Pass	
<b>LCS - % Recovery</b>						
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>						
TRH C6-C9	%	89		70-130	Pass	
TRH C10-C14	%	86		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>BTEX</b>						
Benzene	%	97		70-130	Pass	
Toluene	%	90		70-130	Pass	
Ethylbenzene	%	90		70-130	Pass	
m&p-Xylenes	%	92		70-130	Pass	
o-Xylene	%	91		70-130	Pass	
Xylenes - Total	%	92		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>						
Naphthalene	%	108		70-130	Pass	
TRH C6-C10	%	82		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Polycyclic Aromatic Hydrocarbons</b>						
Acenaphthene	%	92		70-130	Pass	
Acenaphthylene	%	87		70-130	Pass	
Anthracene	%	75		70-130	Pass	
Benz(a)anthracene	%	85		70-130	Pass	
Benzo(a)pyrene	%	91		70-130	Pass	
Benzo(b&j)fluoranthene	%	84		70-130	Pass	
Benzo(g,h,i)perylene	%	93		70-130	Pass	
Benzo(k)fluoranthene	%	107		70-130	Pass	
Chrysene	%	96		70-130	Pass	
Dibenz(a,h)anthracene	%	81		70-130	Pass	
Fluoranthene	%	80		70-130	Pass	
Fluorene	%	91		70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	87		70-130	Pass	
Naphthalene	%	91		70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code	
Phenanthrene	%	71			70-130	Pass		
Pyrene	%	84			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
TRH >C10-C16	%	77			70-130	Pass		
<b>LCS - % Recovery</b>								
<b>Per- and Polyfluorinated Alkyl Substances (PFASs)</b>								
Perfluorobutanesulfonic acid (PFBS)	%	85			50-150	Pass		
Perfluorobutanoic acid (PFBA)	%	83			50-150	Pass		
Perfluorohexanesulfonic acid (PFHxS)	%	88			50-150	Pass		
Perfluorooctanesulfonic acid (PFOS)	%	86			50-150	Pass		
Perfluorodecanesulfonic acid (PFDS)	%	92			50-150	Pass		
Perfluoropentanoic acid (PFPeA)	%	81			50-150	Pass		
Perfluorohexanoic acid (PFHxA)	%	84			50-150	Pass		
Perfluoroheptanoic acid (PFHpA)	%	84			50-150	Pass		
Perfluorooctanoic acid (PFOA)	%	90			50-150	Pass		
Perfluorononanoic acid (PFNA)	%	89			50-150	Pass		
Perfluorodecanoic acid (PFDA)	%	88			50-150	Pass		
Perfluoroundecanoic acid (PFUnA)	%	82			50-150	Pass		
Perfluorododecanoic acid (PFDoA)	%	95			50-150	Pass		
Perfluorotridecanoic acid (PFTrDA)	%	83			50-150	Pass		
Perfluorotetradecanoic acid (PFTeDA)	%	97			50-150	Pass		
Perfluorooctanesulfonamide (PFOSA)	%	88			50-150	Pass		
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	%	109			50-150	Pass		
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	%	92			50-150	Pass		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	%	88			50-150	Pass		
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	%	85			50-150	Pass		
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	%	99			50-150	Pass		
<b>LCS - % Recovery</b>								
<b>Heavy Metals</b>								
Arsenic	%	87			70-130	Pass		
Cadmium	%	89			70-130	Pass		
Chromium	%	93			70-130	Pass		
Copper	%	96			70-130	Pass		
Lead	%	84			70-130	Pass		
Mercury	%	107			70-130	Pass		
Nickel	%	91			70-130	Pass		
Zinc	%	104			70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>								
TRH C6-C9	S16-De13435	NCP	%	84		70-130	Pass	
TRH C10-C14	S16-De13695	NCP	%	123		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>BTEX</b>								
Benzene	S16-De13435	NCP	%	92		70-130	Pass	
Toluene	S16-De13435	NCP	%	84		70-130	Pass	
Ethylbenzene	S16-De13435	NCP	%	84		70-130	Pass	
m&p-Xylenes	S16-De13435	NCP	%	86		70-130	Pass	
o-Xylene	S16-De13435	NCP	%	85		70-130	Pass	
Xylenes - Total	S16-De13435	NCP	%	85		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>								
Naphthalene	S16-De13435	NCP	%	83		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C10	S16-De13435	NCP	%	83		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Polycyclic Aromatic Hydrocarbons</b>				Result 1				
Acenaphthene	S16-De17765	NCP	%	90		70-130	Pass	
Acenaphthylene	S16-De17765	NCP	%	83		70-130	Pass	
Anthracene	S16-De17765	NCP	%	84		70-130	Pass	
Benz(a)anthracene	S16-De17765	NCP	%	87		70-130	Pass	
Benzo(a)pyrene	S16-De17765	NCP	%	94		70-130	Pass	
Benzo(b&i)fluoranthene	S16-De17765	NCP	%	88		70-130	Pass	
Benzo(g,h,i)perylene	S16-De17765	NCP	%	85		70-130	Pass	
Benzo(k)fluoranthene	S16-De17765	NCP	%	105		70-130	Pass	
Chrysene	S16-De17765	NCP	%	94		70-130	Pass	
Dibenz(a,h)anthracene	S16-De17765	NCP	%	83		70-130	Pass	
Fluoranthene	S16-De17765	NCP	%	88		70-130	Pass	
Fluorene	S16-De17765	NCP	%	88		70-130	Pass	
Indeno(1,2,3-cd)pyrene	S16-De17765	NCP	%	84		70-130	Pass	
Naphthalene	S16-De17765	NCP	%	89		70-130	Pass	
Phenanthrene	S16-De17765	NCP	%	72		70-130	Pass	
Pyrene	S16-De17765	NCP	%	91		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1				
TRH >C10-C16	S16-De13695	NCP	%	114		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Per- and Polyfluorinated Alkyl Substances (PFASs)</b>				Result 1				
Perfluorobutanesulfonic acid (PFBS)	S16-De13878	CP	%	73		50-150	Pass	
Perfluorobutanoic acid (PFBA)	S16-De13878	CP	%	75		50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S16-De13878	CP	%	69		50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S16-De13878	CP	%	73		50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S16-De13878	CP	%	71		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S16-De13878	CP	%	55		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S16-De13878	CP	%	76		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S16-De13878	CP	%	61		50-150	Pass	
Perfluorooctanoic acid (PFOA)	S16-De13878	CP	%	92		50-150	Pass	
Perfluorononanoic acid (PFNA)	S16-De13878	CP	%	66		50-150	Pass	
Perfluorodecanoic acid (PFDA)	S16-De13878	CP	%	70		50-150	Pass	
Perfluoroundecanoic acid (PFUnA)	S16-De13878	CP	%	67		50-150	Pass	
Perfluorododecanoic acid (PFDoA)	S16-De13878	CP	%	74		50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	S16-De13878	CP	%	65		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S16-De13878	CP	%	73		50-150	Pass	
Perfluorooctanesulfonamide (PFOSA)	S16-De13878	CP	%	76		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEFOSAA)	S16-De13878	CP	%	63		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De13878	CP	%	50		50-150	Pass	
1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De13878	CP	%	65		50-150	Pass	
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De13878	CP	%	84		50-150	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De13878	CP	%	71			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Heavy Metals</b>				Result 1					
Arsenic	S16-De14057	NCP	%	86			70-130	Pass	
Cadmium	S16-De14057	NCP	%	85			70-130	Pass	
Chromium	S16-De14057	NCP	%	87			70-130	Pass	
Copper	S16-De14057	NCP	%	92			70-130	Pass	
Lead	S16-De14422	NCP	%	102			70-130	Pass	
Mercury	S16-De12999	NCP	%	100			70-130	Pass	
Nickel	S16-De14057	NCP	%	82			70-130	Pass	
Zinc	S16-De13623	NCP	%	72			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 1999 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH C6-C9	S16-De13878	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S16-De13878	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S16-De13878	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S16-De13878	CP	mg/kg	< 50	< 50	<1	30%	Pass	
<b>Duplicate</b>									
<b>BTEX</b>				Result 1	Result 2	RPD			
Benzene	S16-De13878	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S16-De13878	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S16-De13878	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S16-De13878	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S16-De13878	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S16-De13878	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
Naphthalene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S16-De13878	CP	mg/kg	< 20	< 20	<1	30%	Pass	
<b>Duplicate</b>									
<b>Polycyclic Aromatic Hydrocarbons</b>				Result 1	Result 2	RPD			
Acenaphthene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&i)fluoranthene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g,h,i)perylene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a,h)anthracene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1,2,3-cd)pyrene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S16-De13878	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
<b>Duplicate</b>									
<b>Total Recoverable Hydrocarbons - 2013 NEPM Fractions</b>				Result 1	Result 2	RPD			
TRH >C10-C16	S16-De13878	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S16-De13878	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S16-De13878	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate								
Per- and Polyfluorinated Alkyl Substances (PFASs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorobutanoic acid (PFBA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorononanoic acid (PFNA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluoroundecanoic acid (PFUnA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorododecanoic acid (PFDoA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Perfluorooctanesulfonamide (PFOSA)	S16-De12531	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	S16-De12531	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	S16-De12531	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTS)	S16-De12531	NCP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTS)	S16-De12531	NCP	mg/kg	< 0.005	< 0.005	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S16-De15084	NCP	mg/kg		< 2	<1	30%	Pass
Cadmium	S16-De15084	NCP	mg/kg		< 0.4	<1	30%	Pass
Chromium	S16-De15084	NCP	mg/kg		60	3.0	30%	Pass
Copper	S16-De15084	NCP	mg/kg		52	4.0	30%	Pass
Lead	S16-De15084	NCP	mg/kg		18	20	30%	Pass
Mercury	S16-De12998	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	S16-De15084	NCP	mg/kg		62	13	30%	Pass
Zinc	S16-De15084	NCP	mg/kg		65	7.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S16-De13878	CP	%	16	16	4.0	30%	Pass

**Comments**
**Sample Integrity**

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	No
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

**Qualifier Codes/Comments**

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

**Authorised By**

Nibha Vaidya	Analytical Services Manager
Jonathon Angell	Senior Analyst-Organic (QLD)
Ryan Hamilton	Senior Analyst-Inorganic (NSW)
Ryan Hamilton	Senior Analyst-Metal (NSW)
Ryan Hamilton	Senior Analyst-Organic (NSW)
Ryan Hamilton	Senior Analyst-Volatile (NSW)


**Glenn Jackson**
**National Operations Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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## Nicole Rosen

---

**From:** Marc Centner <Marc.Centner@alsglobal.com>  
**Sent:** Friday, 17 February 2017 2:25 PM  
**To:** Nicole Rosen  
**Cc:** Scott James; Jacqui Hallchurch; Paul Loewy  
**Subject:** RE: Full PFAS suite - Lab report ES1629123 - sample reference amended to GW03

Hi Nicole,

We have scrutinised the instrument data, including instrument QC and find, that continuing calibration verification was somewhat marginal in the run from which the first set of results were reported. Over the course of the instrument run, internal standards responses dropped to half of that when the calibration was run. This is seen as systematic rather than symptomatic of ion suppression due to matrix in individual samples.

Based on instrument QC, the higher results in the following report should stand as the correct ones. I believe that these have been confirmed by the additional tests done recently that have been shared with you.

Looking at the sample, **GW03**, in particular, the sample does appear to contain much sediment. Water analysis, be it by direct injection (in this case) or by solid phase extraction, essentially looks at dissolved phase PFAS. Whilst the PFAS compounds are stable, we might see changes one way or the other in terms of increase or decreases in dissolved phase PFAS. For example, if re-tests are performed on samples from ambient storage, this may change dissolved concentrations over time. Your particular sample does provide us with some opportunity to test this and I am happy to keep you abreast of further investigations on this subject.

If you have any further questions, please do not hesitate to contact me to discuss this or related matters.

Regards,

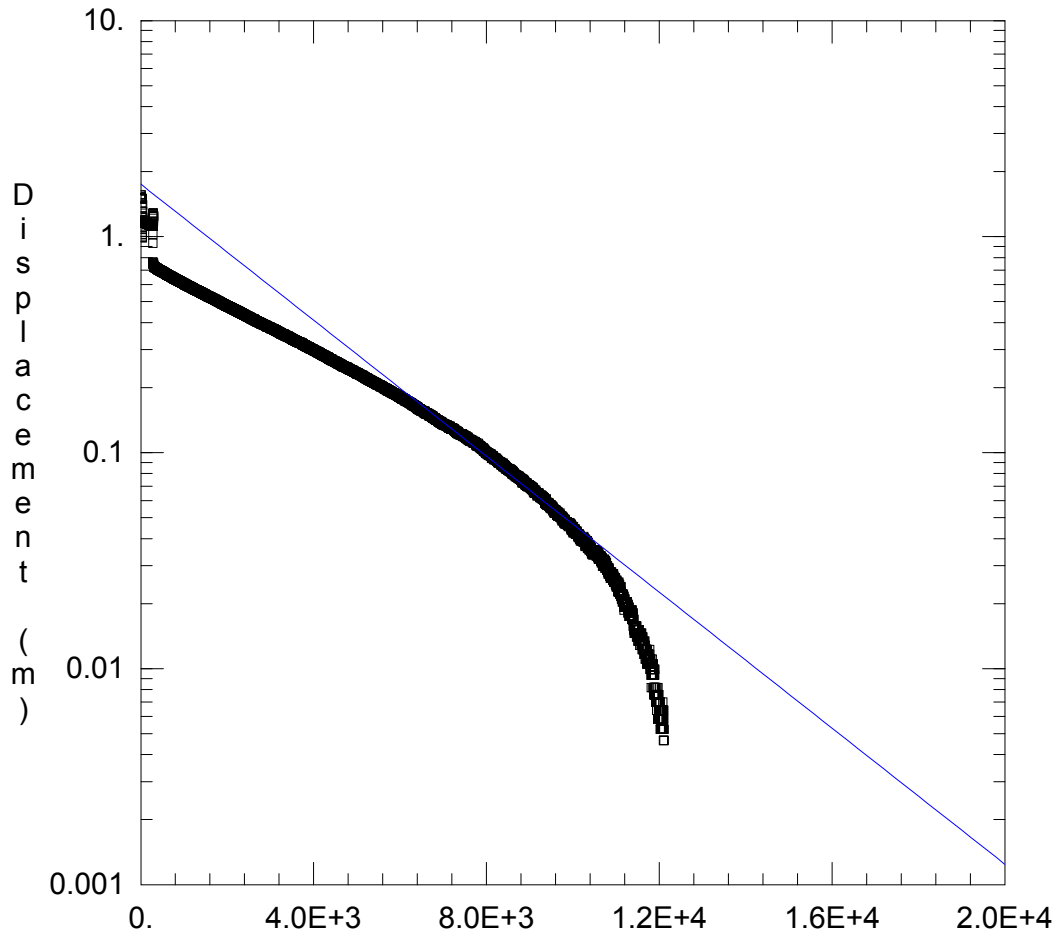
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---

## **Appendix I** – Slug test data



Time (sec)  
SLUG TEST

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW01.aqt  
 Date: 02/16/17 Time: 15:47:23

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW01  
 Test Date: 16/12/16

AQUIFER DATA

Saturated Thickness: 3.008 m Anisotropy Ratio (Kz/Kr): 1.

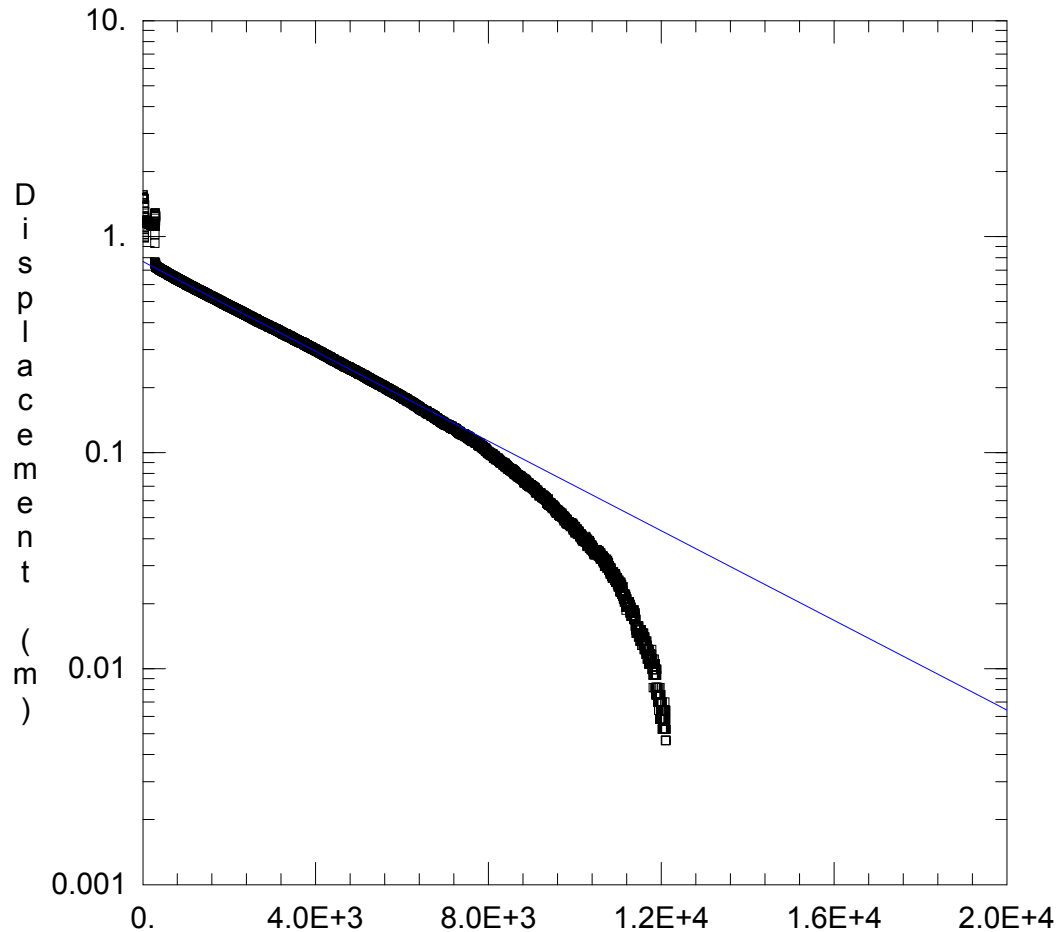
WELL DATA (GW01)

Initial Displacement: 1.558 m Static Water Column Height: 3.008 m  
 Total Well Penetration Depth: 6. m Screen Length: 2. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.01984 m/day y0 = 1.75 m





Time (sec)  
SLUG TEST

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW01.aqt  
 Date: 02/16/17 Time: 15:47:08

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW01  
 Test Date: 16/12/16

AQUIFER DATA

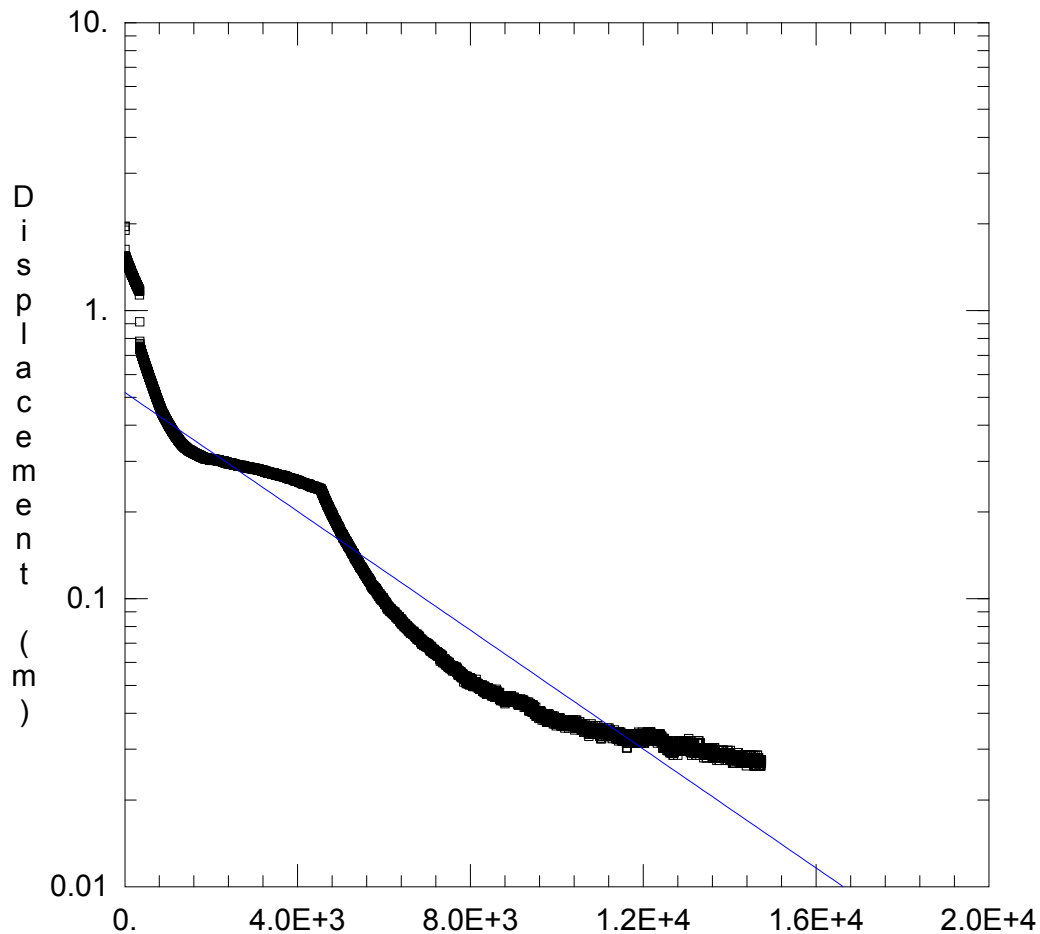
Saturated Thickness: 3.008 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GW01)

Initial Displacement: 1.558 m Static Water Column Height: 3.008 m  
 Total Well Penetration Depth: 6. m Screen Length: 2. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice  
 K = 0.01308 m/day y0 = 0.7663 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW02\_BR.aqt  
 Date: 02/16/17 Time: 11:25:38

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW02  
 Test Date: 16/12/16

AQUIFER DATA

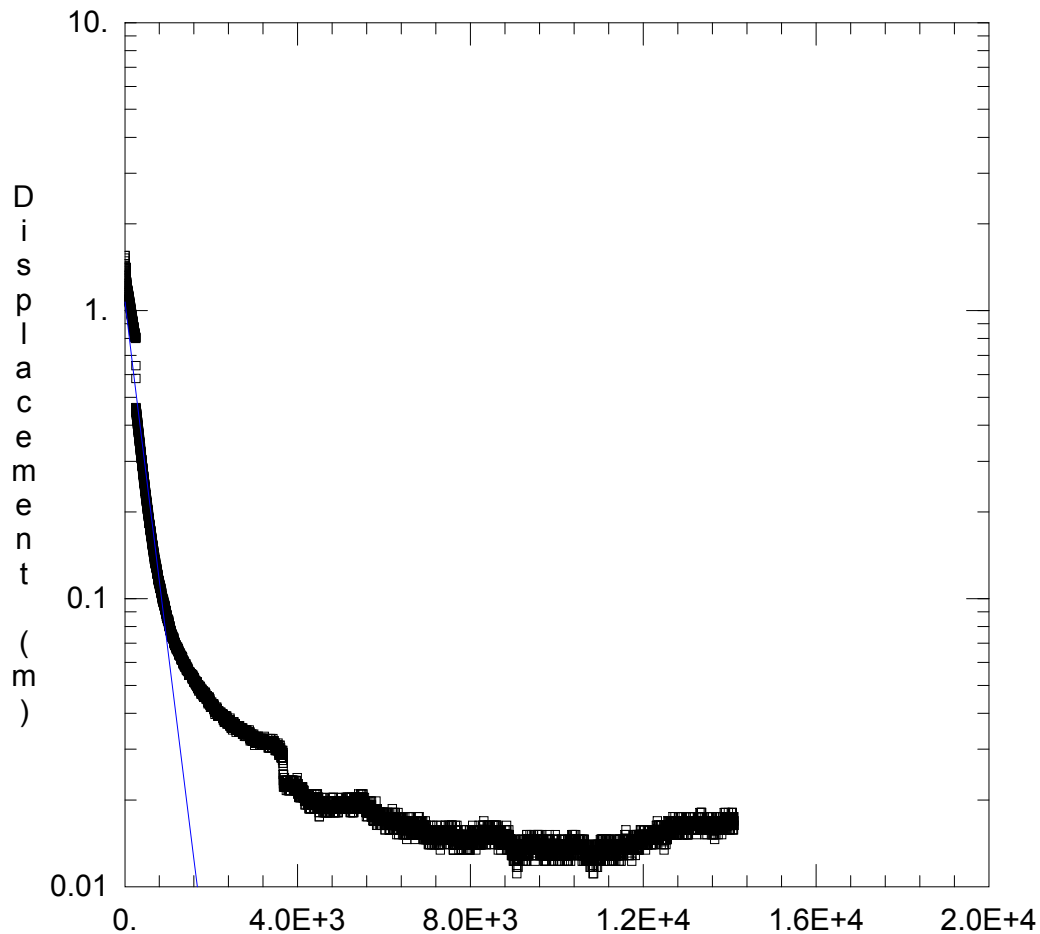
Saturated Thickness: 3.31 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW02)

Initial Displacement: 1.963 m Static Water Column Height: 3.31 m  
 Total Well Penetration Depth: 3.15 m Screen Length: 2. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Confined Solution Method: Bower-Rice  
 K = 0.01418 m/day y0 = 0.5201 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW03.aqt  
 Date: 02/16/17 Time: 15:46:02

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW03  
 Test Date: 16/12/16

AQUIFER DATA

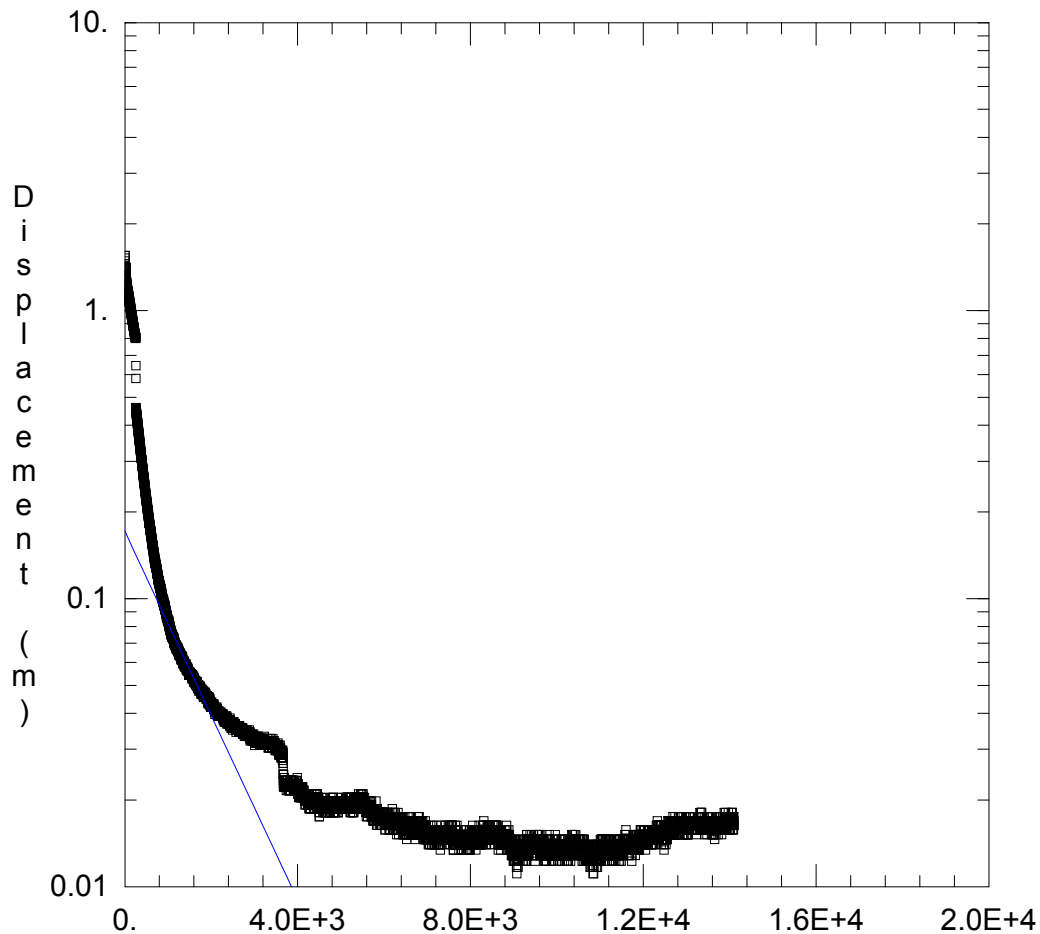
Saturated Thickness: 3.674 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW03)

Initial Displacement: 1.553 m Static Water Column Height: 3.674 m  
 Total Well Penetration Depth: 3.779 m Screen Length: 3. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.1232 m/day y0 = 1.073 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW03.aqt  
 Date: 02/16/17 Time: 15:46:20

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW03  
 Test Date: 16/12/16

AQUIFER DATA

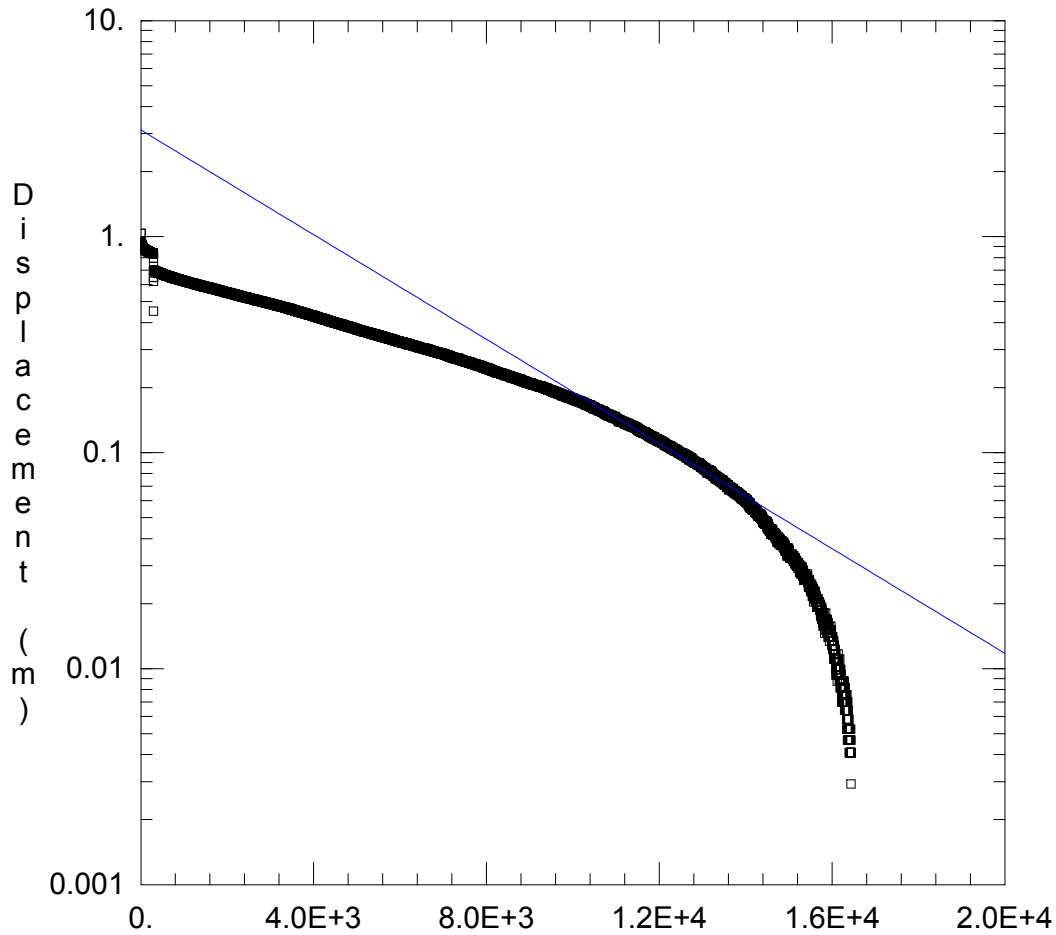
Saturated Thickness: 3.674 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW03)

Initial Displacement: 1.553 m Static Water Column Height: 3.674 m  
 Total Well Penetration Depth: 3.779 m Screen Length: 3. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.03257 m/day y0 = 0.1715 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW04.aqt  
 Date: 02/16/17 Time: 13:59:41

PROJECT INFORMATION

Company: GHD  
 Client: F&R NSW  
 Project: 21/25583/02  
 Location: Albion Park  
 Test Well: GW04  
 Test Date: 15/12/2016

AQUIFER DATA

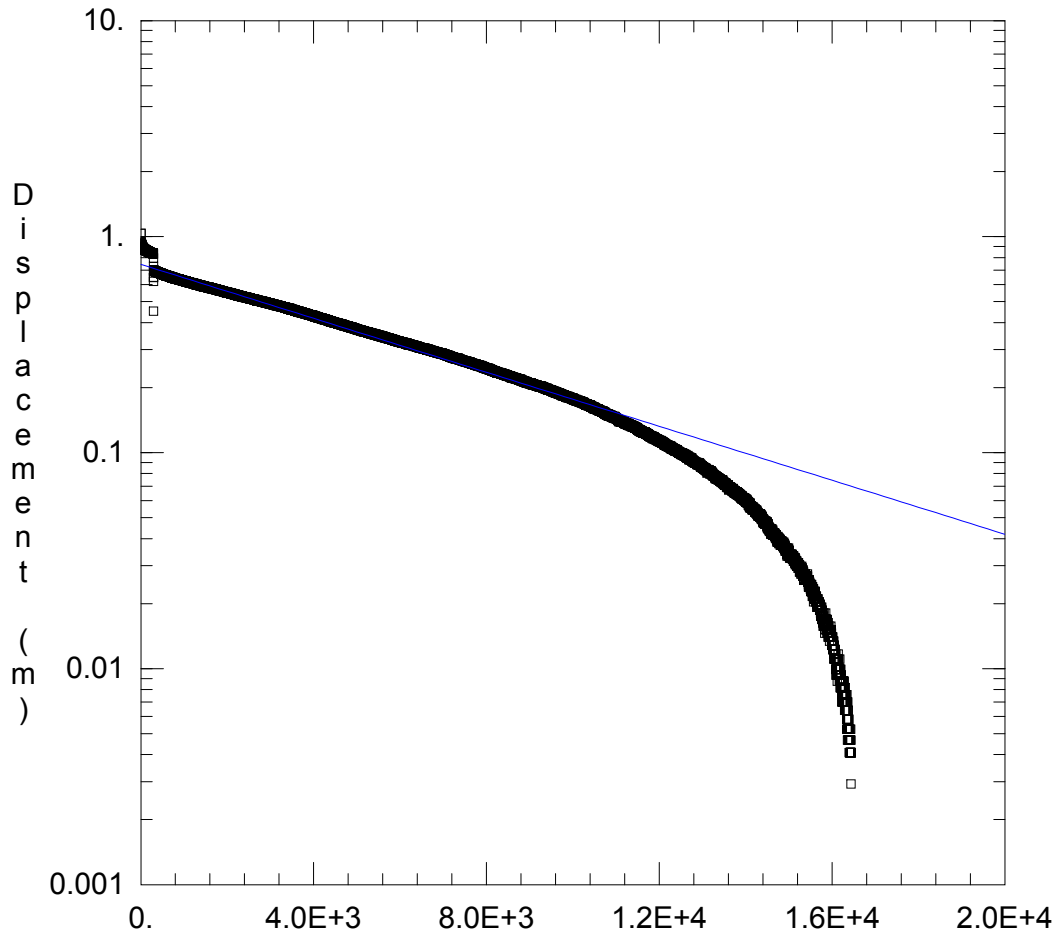
Saturated Thickness: 3.435 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW04)

Initial Displacement: 1.034 m Static Water Column Height: 3.435 m  
 Total Well Penetration Depth: 3.59 m Screen Length: 3. m  
 Casing Radius: 0.025 m Well Radius: 0.0625 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.01006 m/day y0 = 3.118 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW04.aqt  
 Date: 02/16/17 Time: 13:59:17

PROJECT INFORMATION

Company: GHD  
 Client: F&R NSW  
 Project: 21/25583/02  
 Location: Albion Park  
 Test Well: GW04  
 Test Date: 15/12/2016

AQUIFER DATA

Saturated Thickness: 3.435 m Anisotropy Ratio (Kz/Kr): 0.1

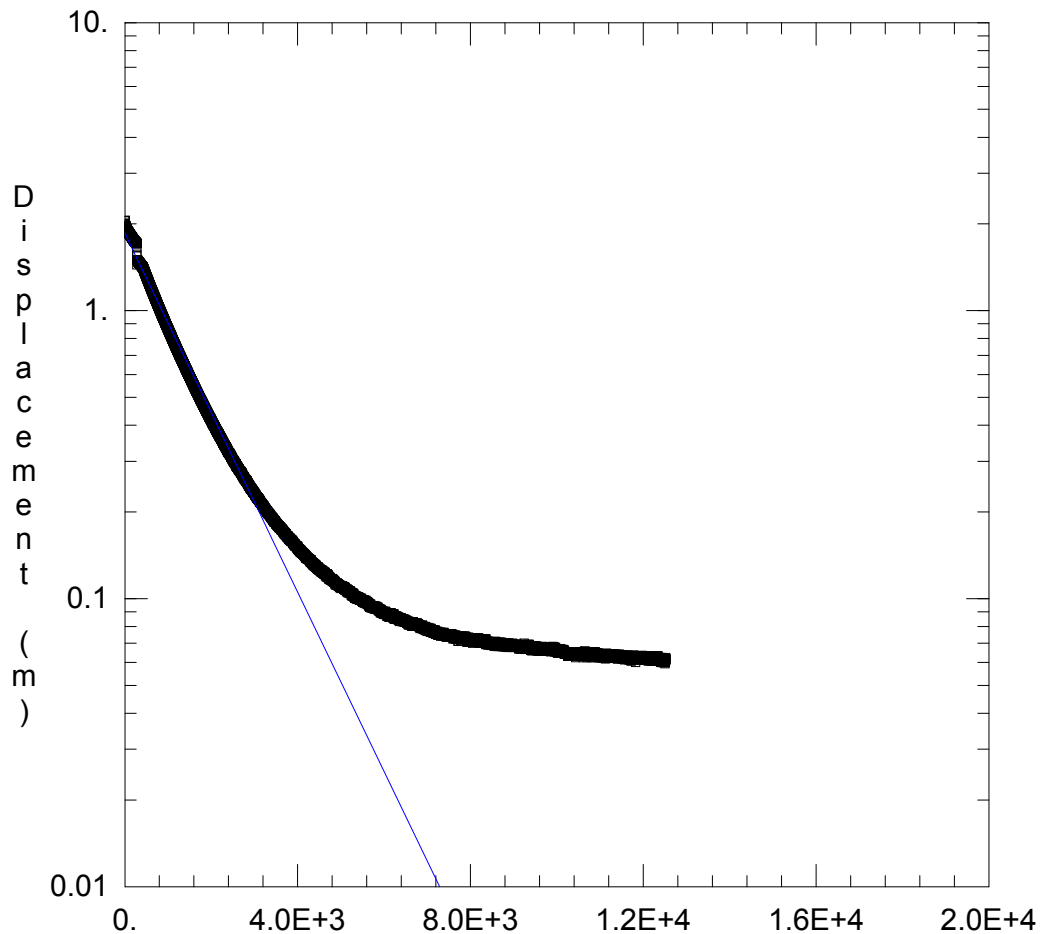
WELL DATA (GW04)

Initial Displacement: 1.034 m Static Water Column Height: 3.435 m  
 Total Well Penetration Depth: 3.59 m Screen Length: 3. m  
 Casing Radius: 0.025 m Well Radius: 0.0625 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.005187 m/day y0 = 0.7445 m





Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW05.aqt  
 Date: 02/16/17 Time: 16:09:53

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW05  
 Test Date: 16/12/16

AQUIFER DATA

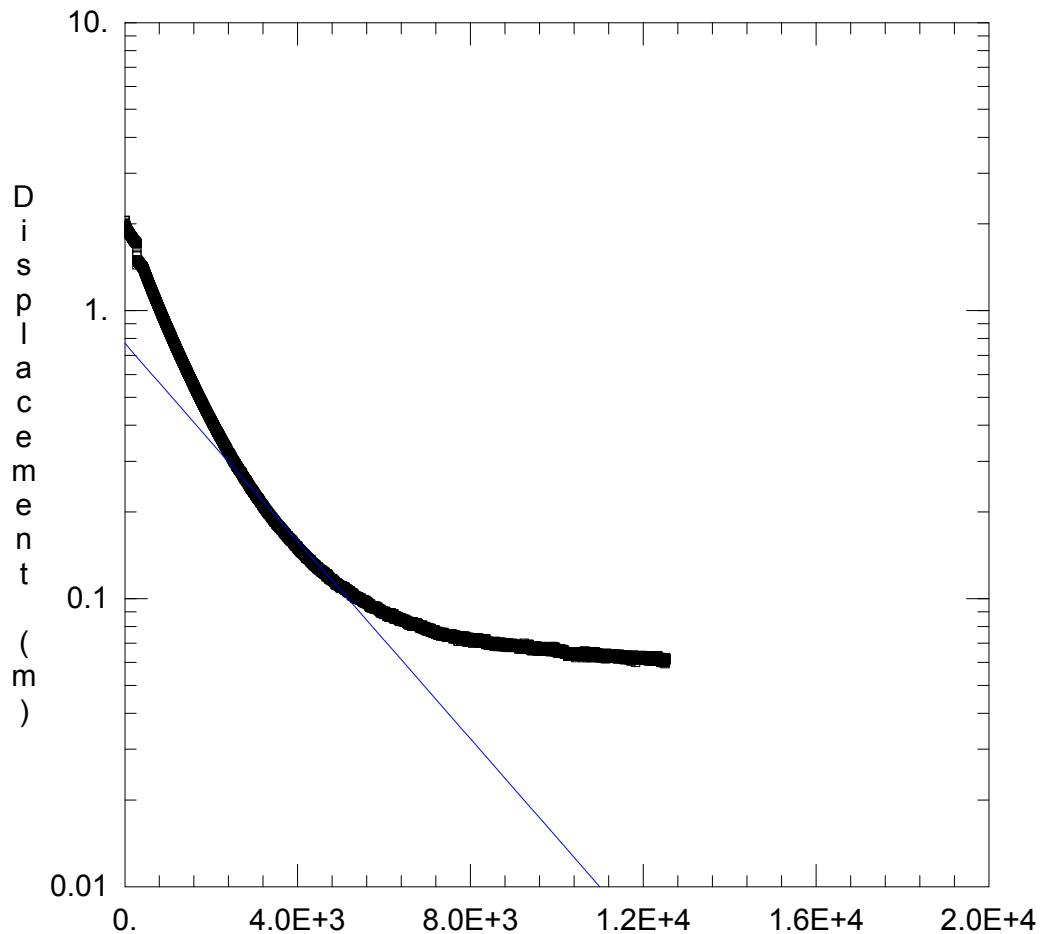
Saturated Thickness: 3.385 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW05)

Initial Displacement: 2.055 m Static Water Column Height: 3.385 m  
 Total Well Penetration Depth: 3.185 m Screen Length: 2. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice  
 K = 0.04262 m/day y0 = 1.86 m



Time (sec)  
WELL TEST ANALYSIS

Data Set: C:\Users\jrlean\Desktop\WSA slug tests\GW05.aqt  
 Date: 02/16/17 Time: 16:10:10

PROJECT INFORMATION

Company: GHD Pty Ltd  
 Client: Fire and Rescue  
 Project: 2125583  
 Location: Albion Park  
 Test Well: GW05  
 Test Date: 16/12/16

AQUIFER DATA

Saturated Thickness: 3.385 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GW05)

Initial Displacement: 2.055 m Static Water Column Height: 3.385 m  
 Total Well Penetration Depth: 3.185 m Screen Length: 2. m  
 Casing Radius: 0.025 m Well Radius: 0.025 m  
 Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bower-Rice  
 K = 0.02349 m/day y0 = 0.7707 m

GHD

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	M. West J. Lean N. Rosen	J. Hallchurch		J. Hallchurch		21/02/2017
1	N. Rosen	J. Hallchurch		J. Hallchurch		27/04/2017

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